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INTERNATIONAL

APRIL 1952

VOLUME 27 • NUMBER 4

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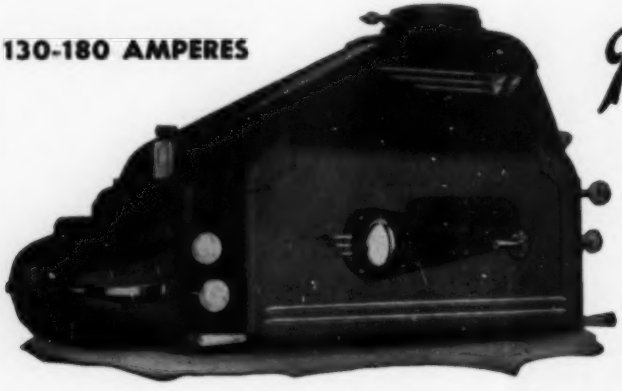

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With Which Is Combined PROJECTION ENGINEERING

HENRY B. SELLWOOD, *Editor*

Volume 27 APRIL 1952 *Number* 4

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MONTHLY CHAT

AS THIS issue of IP rides the mails, the Society of Motion Picture and Television Engineers is in convention; hearing those technical papers and discussing, sometimes heatedly, those differences of technical opinion, upon which the progress and therefore the survival of this industry ultimately depend.

The daily box office take, the weekly pay envelope, are things near and urgent. Buckle reduction in 35-mm film, or a simplified preamplifier with high gain and low distortion, seem distant. Yet without constant attention to technology, and unremitting improvement in it, eventually both the box office take and the pay envelope must dwindle to nothing and vanish.

Foremost among the pioneers of our progress, for some one-third century past, has been the Society of Motion Picture Engineers—now the SMPTE, for the Society itself must be progressive and keep up with the times. It is hard to visualize what either theatres or the projection craft would be like if all the good work of the Society were suddenly wiped out. Neither one would be recognizable.

What is not too often realized or remembered is that an immense part of the Society's work was and is being carried out by practicing projectionists with an IA membership card and an SMPTE membership side by side in the same pocket. For these "engineers" are not invariably graduate engineers with diplomas on their walls. There are and always have been several grades of membership. Anyone concerned with motion picture practices in any way, or even only interested in them, has always been eligible to join in one grade or another. The Society's work is done by men with long strings of academic initials behind their names functioning side by side with Fellows whose only higher education has been in the School of Hard Knocks.

Out of it all, valuable gains are achieved. Improvements are devised. For instance: if motion picture film no longer shrinks as much as in the past because it is now better made, then possibly the once-recommended sprocket diameter is not the most desirable any longer. Would projector manufacturers do better to substitute a somewhat larger sprocket? Here is a perfectly practical question; the Society looked into it thoroughly and recommended a change in sprocket diameters which manufacturers have adapted. The quality of the show is thereby improved; film lasts longer; sprockets last longer; the industry as a whole benefits; the SMPTE has carried through another routine item of its customary work.

Everyone in the industry is welcome to join in one capacity or another and help as far as he wants to or can. The work is never done and never will be. As long as there are a motion picture industry and a television industry there will be need for an SMPTE.

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"THERE'S A BRANCH NEAR YOU"

VOLUME XXVII APRIL 1952 NUMBER 4

Progress Report: No. 1

What's New in Projection Screens

SCREENS are better, more versatile. They have features now that prolong their life—keep them from soiling as easily as in the past. They also may be used in a new way, as attentive readers will have noticed on page 16 of IP for January and page 18 of the February issue. Basic improvements over the screens of yesteryear lie in the materials used, in refinements of construction and in a wholly new psychological concept of the screen's position in the theatre.

For a white screen, the once-favored lithopone and white lead are definitely and permanently out as pigments. They aren't used any more. Lithopone wasn't white enough and white lead didn't stay white. As Leonard Satz of Raytone Screen Company puts it, there is no longer any choice of white pigments—the only thing for the manufacturer to use is titanox. This is the dioxide of titanium. It is whiter than lithopone, and it stays white. It is a very stable chemical, not easily subject to change, not exceptionally expensive and in plentiful supply.

Better Binders

The pigment, however, is only a white powder. It cannot be merely brushed over a surface and left there—it would dust off—it must be bound in place. Some years ago pigment and binder together amounted practically to a white paint. Then plastics came into use as binders, but some of these were readily flammable, some were brittle, some easily turned yellow, and some had all three faults.

In common use today are the vinyl plastics, particularly vinyl chloride. This is not flammable; it won't burn at all. It is not brittle but flexible, so that screens made with it need not be rolled for shipment but can be sent folded—an enormous saving in shipping charges that materially reduces the cost to the theatre and so makes it possible for theatres to replace their screens more often. Vinyl plastics also keep their water-white clearness very well; they have little or practically no tendency to turn yellow. Therefore they need replacing less often so far as internal chemical deterioration is concerned.

All-Plastic Screens

The screen originally was a woven fabric—cotton. A mixture of pigment and binder was painted or otherwise coated upon this fabric. There are still screens of that type on the market. But also coming into increasing use are strengthened plastics that do not need any fabric support at all. These consist of a sheet of plastic into which pigment has been incorporated. They are flame-resistant; there is nothing in or about them that burns. They are chemically stable and retain their whiteness and reflectivity over protracted periods of time. They are flexible and sufficiently crease-proof to be shipped folded and therefore at low cost.

Essentially crease-proof texture and "matte" embossing of modern vinylite screen are shown in this close-up view.

The all-plastic screens often have still another advantage in being more flexible than the fabric-backed type and therefore more resistant to vandalism. When small objects or even pop bottles are flipped or thrown at an all-plastic screen the general tendency of the screen is not to tear but to give way and snap back, almost as if it were a sheet of rubber. This feature contributes still further to their length of useful life.

At the same time a novel development by RCA, described below, actually tends to discourage the deposit of dust on the screen, again lengthening its useful life and reducing the need for replacement.

Refinements of Construction

One refinement (in which manufacturers differ somewhat in their practices) lies in the nature of the embossing given the surface of the screen in order to produce a "matte" surface and thus reduce gloss and sheen. It would not do to project onto a mirror surface. By embossing the surface in a definite pattern the degree and even the direction of the diffusion of reflected light can be substantially controlled. Thus RCA claims, for its Snowhite Screen, that "polygonal embossing in the surface

James Florio and James Dwyer (left), members of New York Stagehands Local 1, look on as Frank Cahill, Jr., director of projection and sound for Warner Bros. circuit, accepts an economically-shipped, folded RCA vinylite screen. At right is Bernard Sholtz, RCA sales representative.

breaks up the natural center aisle hot spot . . . and at the same time converts a large portion of the light usually lost in the stage wings and ceiling."

Further refinements are expected by many in the industry as a result of the very extensive screen brightness survey which has been and still is conducted by the Society of Motion Picture and Television Engineers. Progress has also been contributed in the last few years by investigators working on the problems of large-screen television for theatres. Since they were limited in the amount of light their equipment could produce they tried to compensate for this handicap by developing embossed screens that would direct all the light at the audience and waste as little as possible on side walls and ceiling. More efficient screen reflection was thus achieved; and the principles evolved can be applied to motion picture projection also.

Air-Tight Screen

RCA announced two months ago an "air-tight" screen which consists of any of a number of that company's Snowhite models plus a newly added thin, unperforated backing of black vinyl plastic. This backing peels off readily. In the course of installation, it is peeled away to expose the perforated rear surface over an area sufficiently large to permit normal transmission of sound from the loudspeakers. A kit shipped with the screen includes extra black vinyl material and a roll of black adhesive tape. By means of this kit used according to installation instructions, the rims of the loudspeaker low frequency and high frequency baffles are sealed to the screen. The screen's rear surface is thus completely sealed against backstage air currents.

This is the novel development, referred to above, that protects the screen against dust to a very considerable extent, since a large proportion of the dust that settles on any screen (and the most difficult portion to remove) is that which lodges in, and catches on the edges of, the perforations. This deposit comes from the air currents passing through the perforations. In the air-tight screen no currents of air traverse the perforations—they are sealed. The only air that can still drop dust on the screen is that which passes laterally or vertically along its front surface. The result is a decided decrease in dusting, less need for cleaning, and less frequent need for replacement.

Light-Surround Screen

As noted above, pros and cons of the light-surround screen were abundantly debated in IP for January and March, 1952, and so need be touched upon only briefly here. Theatre architect Ben Schlanger has contended for many years (often at meetings of the SMPTE, where heated debate sometimes followed) that the conventional black masking is psychologically wrong; that it creates the effect of "looking out of a tunnel into a lighted region" and produces eyestrain. Actually, the traditional masking performed three functions. It put the picture into a frame. It hid the projected edges of the aperture. It concealed small picture jump and other irregularities in the projection.

The new, much-discussed "light-surround" screen is RCA's commercial version of the theoretical development of architect Schlanger and his associate, William Hoffberg. It has now been installed in a number of houses. The installation illustrated here is in the Plaza Theatre, New York. The function of framing the picture is fulfilled by the flaring top, sides and floor of the three-dimensional assemblage. The frame, however, is neither black nor of any constant color or illumination. The inner surfaces of the flared frame are lined with titanox-and-vinylite screen material identical with the screen's own surface, and this material is fluctuatingly illuminated by reflection from the screen. The function of concealing the aperture edge and minor projected unsteadiness is performed by portions of the flares nearest the screen. The outer periphery of the projected picture falls on those portions of the flares and is reflected, but not toward the audience; therefore remains essentially hidden.

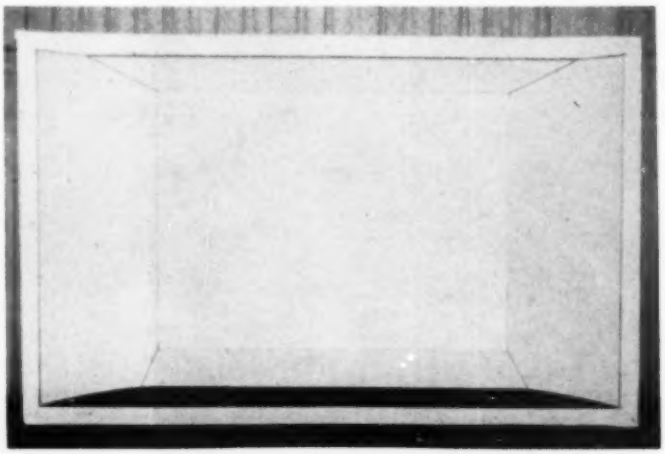
Special Screens

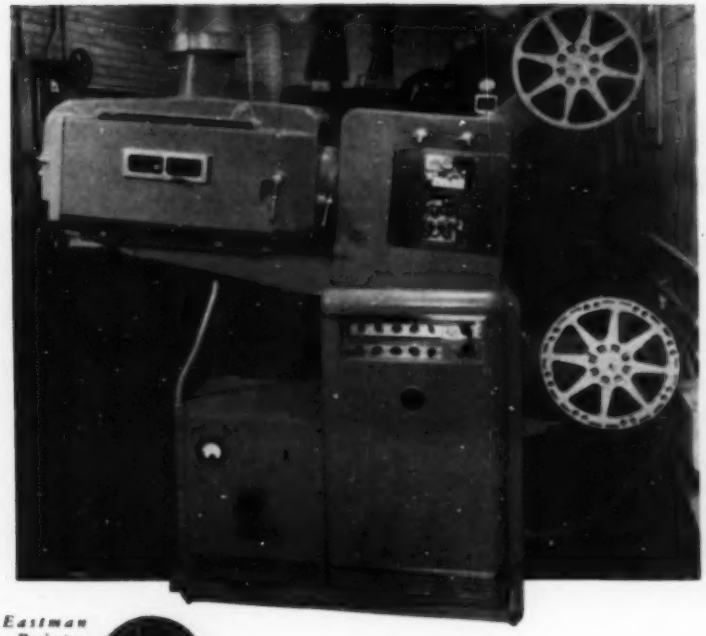
Although the titanium-vinyl screen, with or without fabric baking, is today the most popular type, it is by no means the only kind available. Beaded glass screens can be obtained for narrow auditoriums that can use them satisfactorily; "silver" sheets with embossed aluminized surfaces are on the market. And the titanium-vinyl white itself is offered in several "weights" or qualities and with other special variations.

Meanwhile, however, the drive-in theatre has brought projection technique all the way 'round a full cycle back to

(*Continued on page 25*)

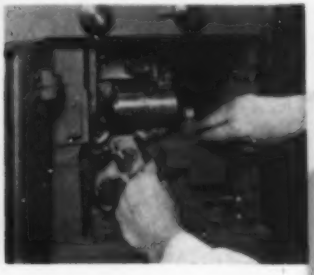
New "light-surround" screen framed in ever-changing illumination by its flared surround, which intercepts light scattered from the screen surface proper. Projected aperture edge falls on flares, not on screen, does not undergo reflection toward the audience, and therefore is essentially "masked" so far as persons seated in the auditorium area are concerned.



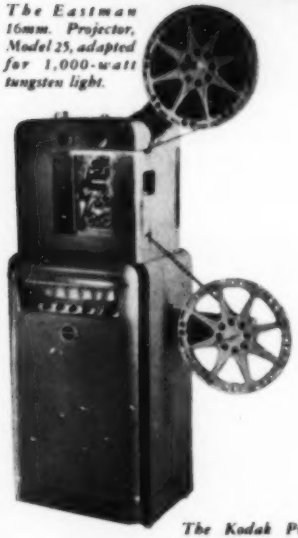


Left, the Eastman 16mm. Projector, Model 25, brings 16mm. projection to the professional level. Shown here, adapted for arc illumination, permanently installed alongside 35mm. equipment.

Below, working parts of the film movement mechanism are in constant view of the operator . . . readily accessible for threading and cleaning.



The Eastman 16mm. Projector, Model 25, adapted for 1,000-watt tungsten light.



The Kodak Projection Ektar Lens, in a choice of four focal lengths, insures superior screen image.

For Professional Quality Sound Projection from 16mm. Film

The Eastman 16mm. Projector, Model 25

This projection instrument—built to a new design concept—eliminates the three major obstacles to theatrical quality 16mm. sound projection . . . excessive wear and high maintenance cost; low signal-to-noise ratio; and excessive flutter.

A major cause of excessive wear and poor quality sound is the constant transfer of shock forces generated in the film pulldown mechanism to other parts of the system. In the Eastman 16mm. Projector, Model 25, the intermittent (film advance mechanism) is completely isolated and independently driven by its own 1440 r.p.m. synchronous motor. Thus, shock forces are sealed off from the rest of the instrument. The sprocket-shutter system is driven by its own 1800 r.p.m. synchronous motor. Exact phasing between the two systems is accomplished by specially designed synchro-mesh gears. In addition, the take-up spindle, rewind spindle, and blower are driven by separate motors.

New Sound Optics

A highly corrected microscope objective, adjustable for optimum sound quality from any type of 16mm. sound film, permits reproduction of variable area or variable density 16mm. sound tracks at extremely low distortion and a maximum signal-to-noise ratio.

To get the best out of any 16mm. sound film, project it on an Eastman 16mm. Projector, Model 25. For information on installation, availability, and prices, write directly to . . .

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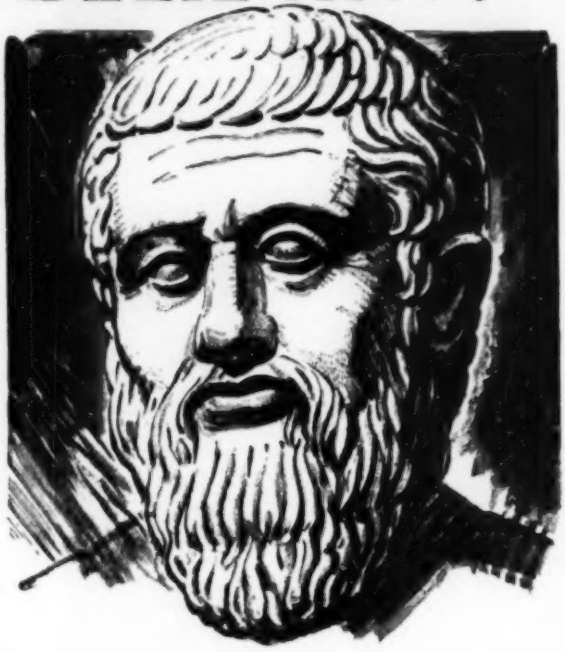
SEEING IS BELIEVING!

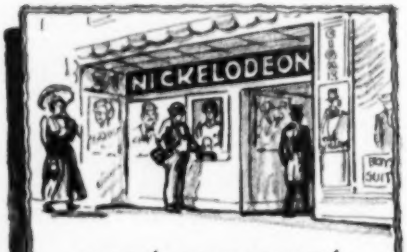
WHAT THE ANCIENTS THOUGHT...

PLATO (347 B.C.) BELIEVED THAT THE EYE **PROJECTED ITS OWN LIGHT,** WHICH MET AND BLENDED WITH THE "FORM" THAT WAS THOUGHT TO FLOW CONTINUOUSLY FROM EACH OBJECT OF SIGHT



TODAY WE KNOW...

THAT, IN SEEING, THE EYE IS STIMULATED BY INNUMERABLE POINTS OF LIGHT **REFLECTED BY THE OBJECT**...THAT THE BRAIN INTERPRETS THESE POINTS AS A TOTAL IMAGE OF THE OBJECT.



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LATEST SURVEYS INDICATE THAT IN **ONE OUT OF EVERY FOUR** U.S. THEATERS, SCREEN BRIGHTNESS IS BELOW THE MINIMUM RECOMMENDED BY THE AMERICAN STANDARDS ASSOCIATION!*

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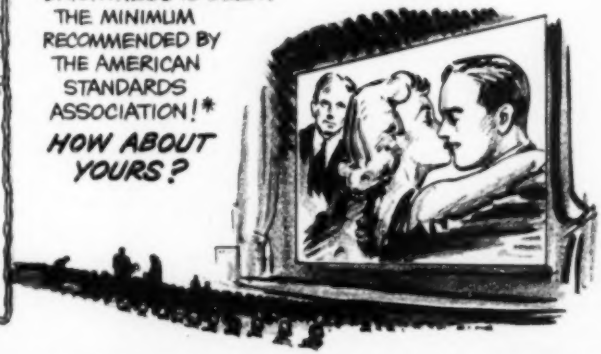
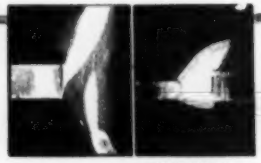


*Report on Screen Brightness Committee Theatre Survey, Journal SMPTE, September, 1951.



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Three-Dimensional Projection in Europe

The extent of European interest and progress in three-dimensional projection is typified by the highly popular stereofilms shown at the recent Festival of Britain, as well as by the work of such investigators as F. A. Weber of The Hague, Holland. Excerpts from current correspondence with Mr. Weber and from one of his recent technical reports; and comment by Gerald Pratley of *Films in Review* upon the three-dimensional showings during the Festival of Britain, are cited herewith as examples of technical developments overseas.

WITH great interest I read the articles about stereofilm in your excellent paper," Mr. Weber writes to IP, "and in return I thought it might be of interest to mention some conclusions arrived at amongst stereo experts in Continental Europe.

"I am in full agreement with Mr. J. A. Norling where he writes: (IP for February, 1952, Page 10) 'Complete visual comfort can be obtained in stereo movies only if the two images are projected simultaneously, if they are rock-steady, if they are of equal brightness, if they are of equal contrast, if they are properly aligned vertically and horizontally, if far distant points are not separated too far in one image from that of the other, and if they are of exactly the same size.'

Stereofilm

"Left and right images of 16-mm film size are suitable only for audiences of up to 100 or so (scientific, industrial, instructional or military audiences) on account of the approximately 60% loss of light which is inherent in all stereo projection systems whether with or without spectacles. . . . This leaves, in combination with single-film projection, only one possibility: alternate positioning of left and right 35-mm images on one 35-film. In case of moving subjects the left and right images must be photographed simultaneously to avoid 'time parallax.'

"Stereo preferably demands a projected image which is wider than that standardized for 'flat' motion pictures. The dimensions of the projected stereo image should be adapted as much as possible to the seeing area of the human eye. Therefore instead of the usual 3 to 4 or 1 to 1.33 of flat pictures it is preferable to use for stereo 1 to 1.65. This can be done by diminishing the height of the 35-mm image somewhat (from 16 to 13.5-mm). . . . This socalled WIDE-VIEW system has already been generally approved by the leading stereo experts of Germany.

"Stereo motion picture films should preferably be in color.

Stereophotography

"Stereo photography demands the use of wide-angle lenses, preferably fixed focus. . . . The stereo base (interocular distance of the camera), and the stereo angle (angle between converging optical axes running from stereocamera to object) should both be kept to that minimum which is just sufficient to produce on projection a true-to-life impression of depth throughout the whole audience. At the moment there are 7 or 8 appropriate formulas: American, Norling and Bernier; English, Dewhurst and Dudley; Dutch, Reijnders; German, Luscher; Russian, Iwanov and Andriewski. Generally, these formulas take into consideration one or more of the following factors: (a) distance from camera to object; (b) focal length of the lens(es) used; (c) range of sharp definition (depth of field) of lens(es); (d) depth of object; (e) projector magnification.

"But for several years it has been felt here in Holland that observation of projected stereo images depends strongly on psychological and physiological factors and that the mathematical formulas need corresponding correction. Attention may be directed to the doctor's thesis of F. H. Reijnders (Utrecht University, November, 1951). Dr. Reijnders, who is both a stereo research worker and a medical doctor, devoted many years to investigating stereophoto projection and the natural laws to be followed in obtaining true-to-life projection throughout the whole of the theatre, taking into account the 40 or 50 percent of spectators who have faulty vision. As a result of this work Dr. Reijnders recommends a physiological stereophoto formula in which the stereoangle is kept constant at 0.6 degrees for any distance and any depth of object (when using medium lenses with a focal length of about 1.6 the diagonal of the negative image). Films photographed according to this formula, Dr. Reijnders finds, give a true to life projected stereo image throughout the theatre and in addition *are observable with a minimum of eyestrain.*

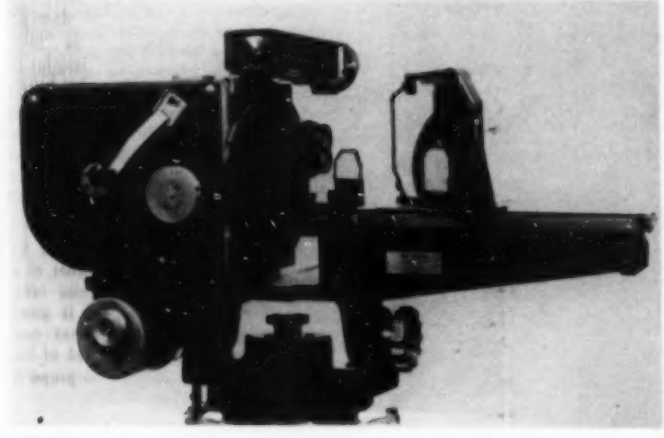
"I have constructed several cameras according to this minibase, miniangle formula. The resulting films, in my opinion and in the opinion of other experienced workers in this field, proved the correctness of Dr. Reijnders formula, strange as it may seem from the stereomathematical point of view. Depth is everywhere, wherever one sits in the audience, yet there is no effect of exaggerated depth when one walks away from the screen.

"Enclosed is a photograph of my new Universal 35-mm Stereofilm camera which can function according to any existing or future formula, its stereobase being variable between ¼ inch and 8 inches, and its stereoangle between 0 and 3 degrees.

"Finally, there is the matter of whether the image should be so photographed that when projected it appears to protrude into the audience. This is a mat-

(*Continued on page 28*)

Weber Universal Stereocamera for 35-mm film with variable stereobase and stereoangle that can be adjusted at will to meet the requirements of every known formula for stereophotography.



Better Film Care Improves Entertainment

PART TWO

To refresh the memories of all concerned, Eastman Kodak Company has prepared a very useful and authoritative set of reminders on film care. IP is glad to reproduce here a condensed version of Eastman's remarks concerning care of film in the theatre, and will in a future issue present a similar condensation of the same company's advice to exchanges.

A CONSIDERABLE portion of the film mutilation which admittedly occurs in the projection room is due to the various types and sizes of cue marks at the ends of rolls. In many cases, these are so carelessly done that large portions of the picture area are affected. Two, three or more sets of marks are not uncommon and they consist of punch marks, lacquer bands, large cross lines and scratches of every description. Examples taken from theater prints are shown in Figure 6. These are but a few of the marks commonly encountered *and many which have been found are considerably worse.*

Loss of footage may be caused by the end of the film whipping around on the rewind or projector take-up before the roll can be stopped. This then makes it necessary to place new cue marks on the film, but it is not necessary to have an elaborate assortment of marks. Many projectionists cover at least some of the unwanted marks with narrow strips of adhesive tape, but these strips have been known to peel off and lodge in the magazine valve rollers.

Sprocket Tooth "Roping"

Sprocket tooth dents, often identified as "roping" or "runoffs" by exchange inspectors, are also a consistent cause of film mutilation. These marks, shown in Figure 7, are commonly seen between the perforations and are also often found through the track and picture areas in a weaving pattern. A "runoff" may start at a poor splice if the film jumps the sprocket, but it can also result from improper threading. Often the film becomes so weakened that subsequent edge bending causes the edge to break. The space between the rollers and the sprockets should be checked, and it is important to see that both rows of perforations are properly engaged with the sprocket teeth before clamping down the rollers.

FIG. 7. A poor splice or improper threading caused "roping" of this print.

FIGURE 6

A few examples of film deliberately mutilated by improper cue marks.

Pleating

Projectionists will recognize the type of damage shown in Figure 8 as that resulting from folding of the film in the sound head due to a break at this point. It is often erroneously referred to as "buckle" by the exchange people.

Edge Bending or Creasing

Projectionists are also familiar with film bending through the perforations, or more often between the perforations and one edge. This type of damage, which is usually referred to as "idler cramping," can be especially harmful in the case of film which is somewhat brittle and when the bending is against the emulsion side, since long edge sections may be broken off completely. This particular type of mutilation has been known to occur repeatedly at the first pad roller following the intermittent loop. The trouble usually starts at an edge break or at a loosened corner of a splice. It might also result from careless threading. If no attention is given to this trouble, this bending may continue as far as the stiffened area of the following splice before the film properly reseats itself.

FIG. 8. Pleating caused by a break in the soundhead and resultant folding of the film.

Misunderstanding still exists concerning the general performance of safety film. Many projectionists are under the impression that the present high acetyl type safety film is the same material which they may have encountered in the years past. This is not so. Present day safety stock now replacing all nitrate film has properties which are fully suited to the requirements of commercial use. The projected screen image obtained from the new safety film is equivalent to that obtained from the former nitrate base materials. In many respects, the new safety material is superior to the nitrate film formerly supplied. Splicing should not be any more difficult with the new film than with nitrate base materials if the proper procedures are followed. A splicing unit of some kind, however, is definitely recommended. *Hand splicing will not give dependable results today.*

Increased Screen Brightness

In recent years much interest has been shown in the problem of obtaining higher screen illumination, particularly for use in drive-in theaters and for indoor theaters having very large screens. Increased illumination has been made possible by developments in high speed optical systems and new types of carbon arcs. With the increase in the screen illumination, there has been a corresponding increase in the temperature of the film at the aperture. The film characteristics place a limit on the maximum light available for screen illumination, since as it is heated to higher temperatures a point is reached beyond which satisfactory projection becomes difficult. Still further increase in temperature may ruin the film beyond hope of repair.

One of the first effects noted in the film as projection intensity is increased is an embossing of the frames and of the image within each frame. When examined by reflected light, at an angle nearly coincident with the plane of the film, each frame can be seen to stand out like a small cushion and frequently the image itself appears as though it were carved into a small plaque. Most film, after having been projected, shows some embossing and the extent of this embossing increases with the light source intensity. This embossing, however, even when severe, does not impair the screen image quality, although when embossed film is spliced to unembossed film it may be necessary to refocus slightly at the splice.

As the light source intensity is increased still further, the film may, in many cases, show a discoloration of the image. This discoloration is not noticeable when the picture is projected upon the screen but when the film itself is examined against a piece of white paper, the frame areas show a distinct sepia tint. No real danger to the print exists, however, as a consequence of this effect, since it is still capable of giving a top quality screen image.

However, if the intensity is increased still further, an in-and-out-of-focus ef-

(*Continued on page 23*)

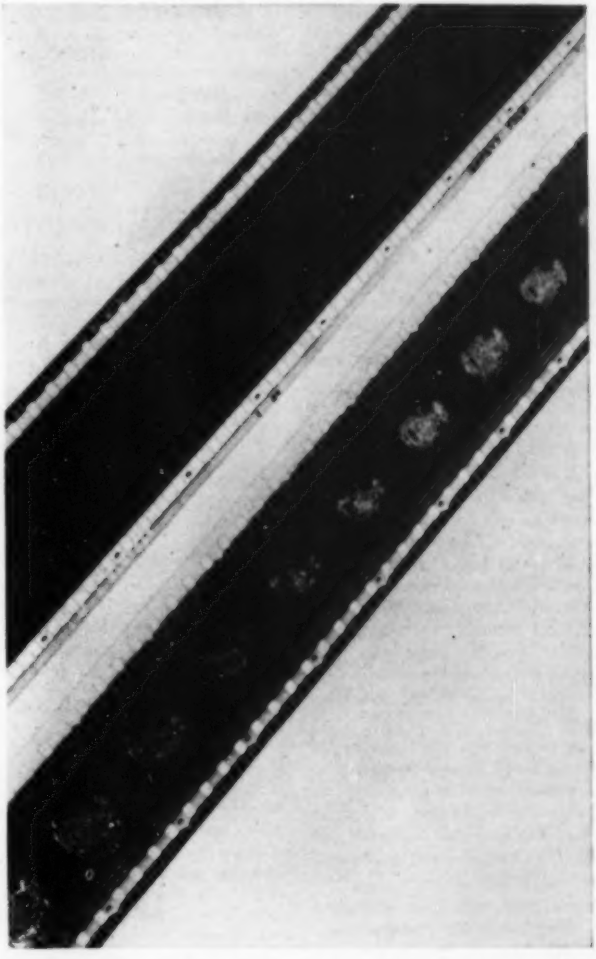


FIG. 9. These prints were ruined by blistering caused by excessive aperture temperature.

Home TV vs. Theater Attendance

By DR. ALFRED N. GOLDSMITH

No man in the United States can speak on this subject with greater authority and impartiality than Dr. Goldsmith. Pioneer consulting engineer in the fields of both radio and television, past president of the Society of Motion Picture Engineers, "elder statesman" of our industry, Dr. Goldsmith is always in closest touch with the facts and the trends, and invariably objective in his public comments. These that follow were prepared by him especially for IP.

TELEVISION has affected motion-picture attendance. When all the radio set owners in a given city have bought television receivers, the theater audiences may drop 30%, or more. However, the well-run theater, operated on an economical basis, and showing a selection of good films, can still stay in the picture. Second-rate theaters, with excessive admission prices and an assortment of "B" pictures, will have trouble. They, as well as the Hollywood producers who cannot furnish high-quality pictures, will be much injured.

Television broadcasting is now running at a profit. Most of the stations are doing quite well. The networks, while not doing as well as the stations, are beginning to get into the black. At least one network is better than breaking even. It usually costs $200,000 or more to establish a station and about $100,000 a year to operate it. New stations lose money for a year or two, as a general rule. Then they break even. After three or four years they make a good annual profit.

The Federal Communications Commission expects that there will be about five hundred stations on the present channels and about two thousand more stations, mostly in smaller cities and towns, on the so-called uhf channels which are soon to be opened up. If this large number of stations is established, the competition may be very severe and profits may be cut down.

On the whole, television seems in a healthy condition and, for the present at least, has strong public interest.

Despite the FCC "freeze" on the licensing of new television stations (which freeze will shortly be lifted), the number of stations in the United States is now 108 and the known number of receivers in the home about 16,200,000. The average audience per receiver during evening hours is about 3.2. The potential evening audience is therefore over 50,000,000—not all of whom, of course, actually view television every evening. Nevertheless, the audience is a large and enthusiastic one. Television aerials dot the roofs of rich and poor alike. And perhaps another four or five million receivers will be installed during 1952.

Television programs, despite occasional commercial announcements which are either too long or too irritating, are well received by the audience. The favorite programs are of the vaudeville type. Dramas and comedy, sports events and give-away shows, and news and debates are popular with the television audience. On the whole, the programs are well received even though it is indeed difficult to produce hundreds of hours of television entertainment each week and to keep the quality at a good level.

TV Freeze Ended

As here predicted by Dr. Goldsmith a month before the fact, the FCC lifted the freeze on new TV broadcast station construction, on Easter Sunday, April 13th. The way was thus cleared for adding 2,053 new telecast stations to the 108 stations at present operating in the United States. "Very high frequency" (54 to 216 megacycles) and "ultra high frequency" (470 to 890 megacycles) figure in the newly-announced thaw.

No specific action was taken by the FCC relative to theater television as distinct from other broadcasting. Industry sources expect that such action may be taken later this year; and that theater TV allocations will be assigned to the UHF band.

Concurrently with FCC announcement, Associated Press revealed that it will supply news-on-film to television broadcasters.

SMPTE Convention Stresses Stereo, TV

TELEVISION and stereoprojection feature the program of the SMPTE's 71st Semi-Annual Convention, scheduled for April 21st to 25th at the Drake Hotel in Chicago. On the first day, April 21st, there will be presented no less than seven papers on TV.

The Society of Motion Picture and Television Engineers stages these conventions twice each year in addition to the many meetings of its local sections held at more frequent intervals in all parts of the country.

The Society's program for the nation-wide Chicago gathering, as disclosed by President Peter Mole, schedules the get-together luncheon for Monday (the 21st) noon and the cocktail hour and banquet for Wednesday evening (the 23rd).

Monday afternoon Robert E. Lewis of Armour Research Foundation; Sam H. Kaplan, consultant; A. D. Fowler and H. N. Christopher of Bell Telephone Laboratories; and Fred Barton and H. J. Schlafly of TelePrompter Corp., will present papers on television. J. A. Norling, Chairman of the Stereoscopic Motion Pictures Committee, will submit his committee's semi-annual report.

Monday evening additional papers on television will be read by M. C. Banca of RCA; by Frank Rissle of Motiograph, Inc.; Victor Trad of Trad TV Corp.; and by John M. Sims of General Precision Laboratory. W. H. Offenhauser, Jr., will present a suggested system of nomenclature for motion pictures and television.

Tuesday morning the convention will hear a report on international standardization by D. R. White; and the report of the Progress Committee by its chairman, Charles W. Handley. Charles Underhill, Jr., of RCA, and Benjamin Schlanger and William Hoffberg, theatre consultants, will describe "The Synchro-Screen as a Stage Setting for Motion Picture Presentation." A new direct-vision stereo-projection screen on which audiences can see the picture in three dimensions without wearing viewing glasses will be unveiled by W. W. Jennings and Pierre Vanet. Tests indicate that with this 3-dimensional screen eye-fatigue is less than with others previously tried, the convention will be told. Ellis D'Arcy and Gerhart Lessman of DeVry Corp. will present a method for measuring screen brightness in rear projection. H. B. Brueggemann of Cinecolor Corp. will reveal a device for measuring aperture illumination brightness continuously while the picture is being projected.

Tuesday afternoon will be devoted largely to military aspects of motion picture projection. On Tuesday evening both Bell and Howell and De Vry will introduce new 16-mm magnetic-optical sound projectors. The Harwald Company shows a film-inspecting machine.

Wednesday will be devoted chiefly to

(*Continued on page 26*)

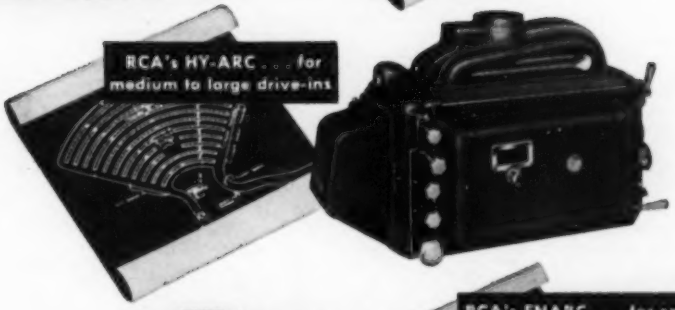
NOW ...the RIGHT lamp for every drive-in requirement

RCA's complete line of lamps provides just the right light for your particular layout!

Big screen or little screen, there's a tailored-to-fit RCA lamp to fit your own special drive-in needs. For instance . . .

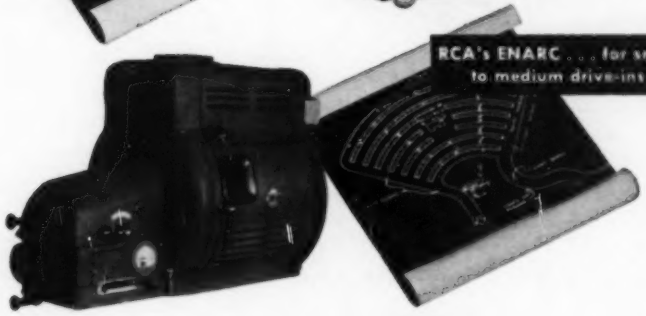
RCA's BRITE-ARC . . . for larger drive-ins

Produces an abundance of snow-white illumination. Water-cooled with rotating positive carbon and wide range of carbon control. Uses 9mm or 10mm carbons burning at 90 to 110 amperes. Big 16-inch reflector, precision-positioned with easy-access adjustment knobs.



RCA's HY-ARC . . . for medium to large drive-ins

Plenty of light for intermediate-size screens. Operates on 9mm full 20-inch carbons at 75 to 90 amperes, with low arc voltage for reduced carbon consumption. Magnetically stabilized arc flame. Water-cooled, nonrotating positive carbon. Big 15-inch high-speed reflector. Extra-large interior for cool operation, rapid dissipation of heat. Easy-access controls on operating side of lamp house. Operating components completely protected against dirt.



RCA's ENARC . . . for small to medium drive-ins

The most light for the least cost. Burns 7mm or 8mm carbons at 45 to 75 amperes. Entire negative carbon-feed mechanism is instantly removable, can be serviced in a jiffy. Generous ventilation, functional styling, modern design throughout. Easy-access controls.

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For full story on RCA's great line of super-dependable drive-in lamps, call your own RCA Theatre Equipment Dealer . . . *today*.

THEATRE EQUIPMENT

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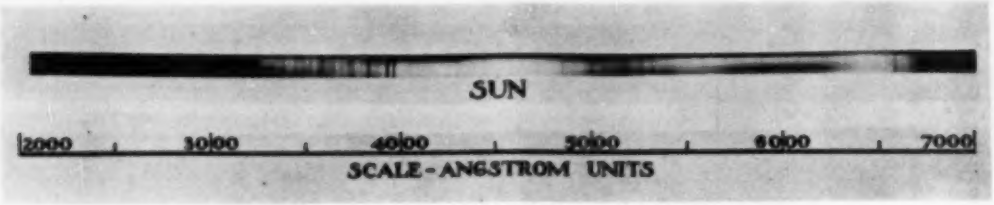


RADIATION SPECTRUM OF SUNLIGHT AS MEASURED IN ANGSTROM UNITS ONLY

Light and the Angstrom Unit

DISCUSSIONS of motion pictures, radio, television, radar, X-rays, and literally hundreds of other electronic devices bring repeated reference to wave frequency and wavelength and their measurement. It is necessary to define the characteristics of light radiation from a given source in exact terms, and the usual unit of measurement is the Angstrom Unit.

Knowledge of the generally accepted theory of light radiation is essential in order to understand the meaning of such a unit. As is well-known, all forms of radiant energy are compared to the ripples produced when a stone is dropped into a pool of still water, causing concentric waves to radiate in all directions. Light waves, radio waves, infrared waves, ultraviolet waves and X-rays, all traveling at 186,000 miles per second, are of the same family (electro-magnetic) and are physically identical in nature as respects their speed of travel and their composition; they differ only in their frequency of vibration or wavelength. By frequency is meant the number of complete waves or cycles passing a given point in one second, and by wavelength is meant the distance between successive wave crests.

Color and Frequency

A violet ray at the limit of visibility has a frequency of 750 million million vibrations per second; a certain green ray has a frequency of 600 million million; while one of the red rays has a vibration frequency of 400 million million per second. These frequencies are so high that even at the tremendous speed they travel the longest wave length (or distance between wave crests) of visible radiation is but 0.00003 inch long, and the shortest about half that length.

Light also is known to be far more complex than it appears to the human eye. The eye cannot separate a beam of light into different colors. Daylight, for example, consists of an essentially even balance of all spectral colors. Color is the perception of wavelength differentials within the visible spectrum. However, the eye does not respond to all colors. The infrared or heat waves have too long a wavelength to be perceptible to the eye, and the ultra-violet rays have a wavelength that is too short to be seen. The colors between these extremes are referred to as the luminous (visible) rays and these may be further identified by the color sensation they produce on the eye.

Measuring Stick for Wavelengths

Using minute fractions of the familiar units of measurement, such as millimeters, inches, feet and so on, would involve astronomical figures that obviously would be neither convenient nor practical. To use our shortest familiar unit of length, the millimeter, in defining wave lengths would be equivalent to giving the size of this page in miles rather than inches. In order to establish a more convenient unit for measuring the wave length of light, the Swedish physicist, Dr. A. J. Angstrom suggested a unit that is 1/100,000,000 centimeter in length. This is called the Angstrom Unit, in honor of its originator, and usually is abbreviated to A.U. Colors in the luminous range of the spectrum may be defined by this scale as follows:

Violet	4000 to 4500 A.U.
Blue	4500 to 4900 A.U.
Green	4900 to 5700 A.U.
Yellow	5700 to 5900 A.U.
Orange	5900 to 6300 A.U.
Red	6300 to 7000 A.U.

Thus it is evident that the visible range of the spectrum is from 4000 to 7000 A.U. The shortest rays reaching the eye in natural sunlight are about 2900 A.U., which are too short to be seen.

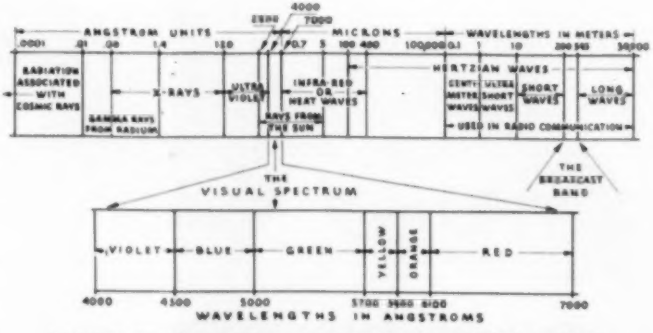
Another unit, which is ten times the length of the Angstrom Unit, also is widely used. This is called the *millimicron*. Microns and millimicrons are perhaps more convenient yardsticks for the longer wavelengths such as heat; and meters and centimeters for the still longer wavelengths of radio. For light measurements, the Angstrom Unit is commonly preferred.

The accompanying table sets forth the

(*Continued on page 26*)

LIGHT MEASUREMENT UNITS CONVERSION TABLE

1 millimeter	=	0.1 centimeter	=	0.03937 in.	= 1000 micron
1 micron	=	.0001 cm.	=	.00003937 in.	= 1000 millimicron
1 millimicron	=	.0000001 cm.	=	.00000003937 in.	= 10 A.U.
1 A.U.	=	.00000001 cm.	=	.000000003937 in.	



ELECTRO-MAGNETIC SPECTRUM AS MEASURED IN ANGSTROMS, MICRONS AND WAVELENGTHS

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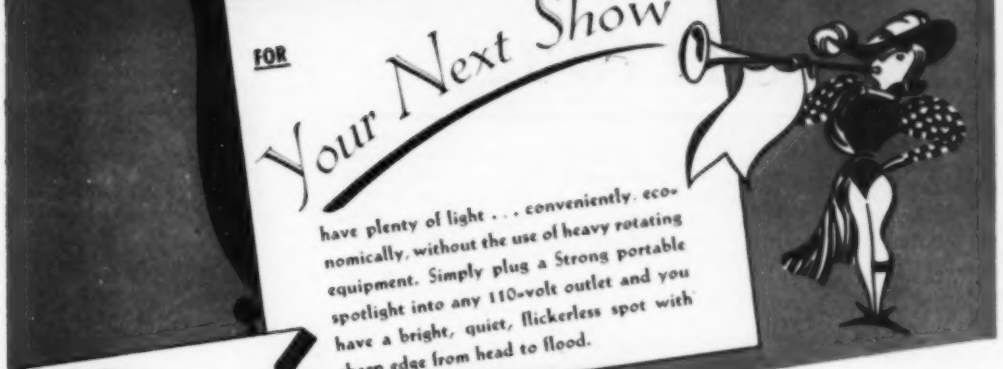
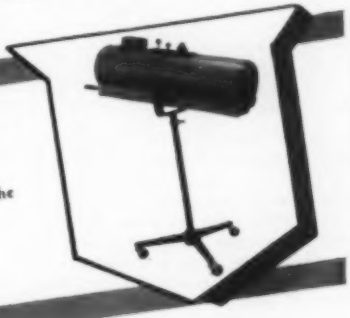
have plenty of light . . . conveniently, economically, without the use of heavy rotating equipment. Simply plug a Strong portable spotlight into any 110-volt outlet and you have a bright, quiet, flickerless spot with sharp edge from head to flood.



THE TROUPER HIGH INTENSITY ARC SPOTLIGHT

for large theatres, arenas, auditoriums, ice shows.
Adjustable, self-regulating transformer in base. Automatic arc control.
A trim of carbons burns 80 minutes.



TROUPERETTE INCANDESCENT SPOTLIGHT

for small theatres, hotels, night clubs, schools and colleges.
Projects 6½ times brighter headspots. Utilizes all the light through most of the spot sizes as contrasted to spotlights which vary spot size solely by irising, thus losing substantial light.

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IN THE
SPOTLIGHT

WE are glad to report that the Erwin-Travia bills, aimed to prohibit political contributions by union members, were defeated by the New York Assembly on the last day of the 1952 session. The bills, which were bitterly opposed by A F of L and CIO unions in the state, called for provisions that banned direct contributions from the general funds of a union, and prevented any union officer or agent from soliciting for voluntary contributions from union members to a political campaign. The bills were obviously aimed at Labor's League for Political Education, and were an attempt to stifle political activities by the unions.

• San Antonio Local 407 lost one of its old-line members in the recent death of Charles R. Breuning. He had been in failing health for some time and had been off his job since July of last year. Breuning was one of the Local's most highly respected members and his death left a void in the hearts of his many friends in the Alliance.

• Action was taken recently by IA Hollywood Local Unions to protect their members from fly-by-night motion picture producers who operate on the proverbial "shoestring" and very often find themselves unable to meet their payrolls. In the future, these independent producers will be required to post a bond for salaries for a two-week period, or, in cases where production will take less than two weeks, the bond will have to cover the number of actual working days. It is hoped that this action will eliminate the growing tendency to produce pictures without proper financial backing, very often resulting in a considerable amount of money being lost to the workers.

• The officers and members of Buffalo Local 233 recently held a grand jubilee at the union headquarters, 498 Pearl Street, in celebration of the burning of the mortgage on the building.

• According to an article appearing in a recent issue of the *New York Times*, a survey among first-run theatres in Los Angeles shows a 7% increase in gross business for the first quarter of 1952. This bears out our contention that despite Tv or advanced admission prices, the public will turn out for motion pictures when it is given the kind of entertainment it wants.

• Local 586 (Columbus, Hastings, Norfolk, Grand Island, and York), Nebr., celebrated its 25th anniversary at a party held at the Hotel Yancey, Grand Island, on April 16. Top IA officials were present at the banquet and the membership turned out en masse for the occasion.

• James V. Sipe, secretary of Local 171, Pittsburgh, Penna., represented his Local at the recent A F of L Convention in Wilkes-Barre.

• We recently learned of the death of Bert F. Neal, 39, member of Local 720, Las Vegas, Nev., following a major operation. Neal served Local 720 in various official capacities. He was business representative for the Local from 1947 to 1949; a member of the Clark Country Central Labor Council in 1949; and served as a delegate to the Cleveland, 1948, and Detroit, 1950 IA Conventions. Funeral services were held in Karnes City, Texas, where his parents, Thomas and Ida Neal, reside.

• California District Council No. 2 held its first 1952 meeting several weeks ago at the Carolina Pines Cafe in Hollywood. Theatre Tv and wage negotiations with the major circuits were among the important topics discussed at the meeting. The next Council meeting is scheduled to be held next May in Santa Barbara.

• In our opinion, the following excerpt from a recent address by Elmer Davis, the noted news analyst, is worth reprinting here:

The most important thing in the world is the freedom of the mind, from which all other freedoms spring. It is a dangerous freedom, but this is a dangerous world; you can't think right without running the risk of thinking wrong. But for any momentary evils that may come from thinking, the cure is more thinking; errors will correct themselves. Without the freedom of the mind, the human race will never get anywhere.

• William H. Hartnett, business representative for Local 257, Ottawa, Ont., was publicized several weeks ago in one of Ottawa's dailies, *The Evening Citizen*, and was described as a "pillar of the theatrical world in Ottawa." And rightly so, we believe, for William Hartnett has been active in theatrical circles for the past 44 years, having started his career in show business in 1908, when at the age of 13 he distributed handbills for one of the local theatres. From there he went on to ushering at the first Keith Theatre in Ottawa, later working as a relief projectionist, and still later serving in World War I.

Upon his discharge from the Canadian Army in 1915, Hartnett joined the newly formed IA Local 257. He served the Local in various official capacities since 1916, holding the office of president from 1919 to 1925, and was elected to his present office as business representative in 1927. He has met a number of stage and screen celebrities who played Ottawa, and when caught in a reminiscent mood he can rattle off many an interesting yarn about them. Bill Hartnett has represented his Local at IA and District Conventions for many years, and has gained the respect and admiration of his many friends in and out of the Alliance.

• Morris J. Rotker, member of New York Local 306 and past president of the 25-30 Club, was unanimously re-elected chairman of the local school board, District No. 18, Bronx, N. Y. He was recently presented with an honor award certificate by the New York City Board of Education for his "outstanding contributions towards the welfare of the youngsters of the City of New York, and for his suggestions for the Board policy which have shown creativeness, originality, and initiative."

Morris J. Rotker, member of New York L. 306

From reports reaching this corner, Rotker richly deserves these honors, for he devotes much of his time away from his job as projectionist at the RKO Marble Hill Theatre in New York to the needs and problems of his less fortunate fellowmen.

• A dispute in wages between Local 631, Orlando, Fla., and Gordon-Niblack, Inc., new owners of the Carver and Lincoln Theatres, ended in a deadlock and at

(*Continued on following page*)

Green Light for Pension Plans

UNIONS are now free to negotiate and establish paid retirement programs for their members, or to improve existing plans, without incurring a penalty in so doing, notes *American Federationist*, the official publication of the A F of L, in its March, 1952 issue. Employer contributions toward the cost will no longer be charged against any wage increases which might otherwise be permissible under wage stabilization regulations.

After more than a year of deliberation, argument and delay, *Federationist* points out caustically, the Wage Stabilization Board has finally decided that elderly pensioners are not responsible for inflation. In a new policy ruling adopted on February 22 and issued as General Wage Regulation No. 21, the Board agreed to remove employer-financed pension plans from the cold storage vault.

The regulation places no fixed limits upon the amount of benefits which may be provided upon retirement or in case of permanent and total disability before retirement, nor upon the amounts which employers may contribute to a pension fund. Unions and employers are free to adopt any type of benefit formula, or method of determining the amount of pension to be paid to retiring members, that they desire.

Requirements

The only specific restrictions to which they must conform in order to obtain "automatic" approval for their plans are as follows:

(1) The normal retirement age for full benefits must be at least age 65. Benefits paid to employes who retire before age 65 must be reduced to the extent necessary to take account of the shorter period of service before retirement. Except in the case of early retirement for disability, they must also be reduced to take account of the longer period of life expectancy during which the pension will be paid and other "actuarial" factors.

(2) Payment of benefits, except death benefits, must be spread over the lifetime of the employe. They cannot be paid in a cash lump sum.

(3) The plan cannot provide for the payment of cash benefits, derived from employer contributions, to employes who sever their employment before retirement. However, "deferred vesting" rights, whereby the employe receives a paid-up annuity or permanent equity in the pension fund which will pay off when he does reach age 65, may be provided.

Procedure

Before a plan can be put into effect, the union and employer must file a report of the details of the plan directly with the Wage Stabilization Board in Washington. The Board is now preparing a special form for this purpose. Copies of the form will be available at offices of the Wage and Hour Division of the Labor Department.

The Board will acknowledge receipt of this report, and unless the parties are notified to the contrary within 30 days after the date of the acknowledgment letter, they may put their plan into effect as of the effective date provided for in the terms of the plan.

Reports of pension plans which do not conform to the restrictions described, or which the Board feels may be "unstabilizing" on other grounds, will be treated as petitions for approval, and the unions and employers will be so notified. Such plans cannot be put into effect until the parties receive notice that the Board has approved them.

The regulation imposes the further requirement that a plan must eventually obtain Bureau of Internal Revenue approval for tax exemption before the Board will regard it as "finally" approved. However, the parties do not have to sit out an extended wait for Internal Revenue approval before putting their plan into effect, but may do so as soon as it clears the Wage Stabilization Board.

Profit-Sharing

Regulation No. 21 also covers "profit-sharing" plans of the deferred compensation type. Profit-sharing plans which provide retirement, total and permanent disability or severance benefits may be put into effect, *after* Bureau of International Revenue approval, if (1) benefit payments do not begin until at least ten years after an employe's admission to the plan and (2) such payments are payable over at least a ten-year period.

Approval is subject to the same reporting and waiting-period procedure as in the case of straight pension plans.

RCA 7-Inch Monitor Kinescope

RCA has produced a new 7-inch, direct-view kinescope designed for monitor service in conjucntion with theatre, industrial, and portable Tv equipment.

Heart of the industrial kinescope (RCA-7TP4) is a newly-designed electron gun of the electrostatic-focus type which has been engineered to provide high picture resolution and to maintain good uniformity of focus over the entire picture area. Focus can be maintained automatically with variation in line voltage and for changes in picture brightness.

The 7TP4 also features a metal-backed fluorescent screen which heightens picture brightness and contrast, and, equally important, eliminates the need for an ion-trap magnet. The new monitor tube measures 13⅛ inches in length and provides a picture 5⅝ by 4 inches.

Baughman for GPL on Coast

West Coast representative for all General Precision Laboratory television equipment is now E. J. Baughman, who has been well known in electrical sales and engineering in the Far West for over 30 years. His background includes a degree from Stanford and long experience in radio, electrical specialties and television. Baughman will handle sales of GPL's TV camera, recording, switching and projection apparatus from headquarters at 350 South Central Avenue, Los Angeles.

(Continued from preceding page)

this writing the theatres are being picketed by the union. The new owners refused to pay the projectionists the $1.97 per hour agreed to by the former management and approved by the War Stabilization Board.

• Albert Reith, member of Boston Local 182, is back on the job at the Keith Memorial after a month's sojourn on the sunny beaches of Miami.

• IA President Richard F. Walsh appointed John J. Francavilla, former president of the Laboratory Technicians Local 702 New York City, International representative of the IA's new radio-television department.

• Joe Perlman, veteran member of New York Local 306 and member of the 25-30 Club, sailed on the U. S. liner *Independence* recently for a visit to Israel where he will be reunited with his mother, whom he hasn't seen for about 40 years. Joe left Rumania, his birthplace, when a youngster and although he made many attempts in the intervening years to get his mother out of that country, his efforts were fruitless. Several months ago, however, the restrictions in that country were lifted for a short period and a limited number of its citizens were permitted to leave for other countries. Joe Perlman's mother was one of the fortunate few. That the reunion will be a joyous one is a foregone conclusion.

• We regret to report that Joseph Monaco, business representative for Local 366, Westchester County, N. Y., died suddenly on April 8. Monaco was an official of the Local for many years and his untimely death was a shock to his associates and fellow-members.

Arclamp Generators

By ROBERT A. MITCHELL

II. Generator and Arc Circuits*

THE dynamo is roughly analogous to a force-pump in action. The pump (generator) does not *create* water (electricity), but merely sets up a current of water (current of electricity) by creating pressure (voltage) which overcomes the resistance (ohms) opposing the flow of current (amperes) in the external circuit.

The two essential parts of a dynamo are the field magnet and the armature. The field magnets establish magnetic "lines of force" in space which are "cut" by the revolving armature. Provision is made by the commutator and brushes for collecting the current induced in the armature.

Because the induced current periodically reverses itself as the various coils pass under north and south magnetic poles, thus being an *alternating* current, the commutator also acts as an automatic reversing switch to convert this AC into *direct* current. If a pair of slip-rings be substituted for the segmented commutator, AC appears at the generator terminals; and the generator is then called an "alternator" instead of a "dynamo."

One of the most important mechanical features of the dynamo are its bearings. These are subject to wear, and hence must be lubricated and kept up in good condition by the projectionist. The care of bearings will be taken up in the concluding installment of this series.

As previously stated, the electrical performance-characteristics of dynamos are determined largely by the manner of wiring and connecting the field coils.

Types of Dynamos

A *series dynamo* is thus called because its field windings are connected directly in series with the commutator brushes and the external circuit. (See Fig. 2.) One lead from the field is connected to one of the brushes, the other lead to the external circuit, and the return from the external circuit to the remaining brush. All of the current passing through the armature and external circuit must also pass through the field windings. For this reason, the series field windings consist only of a few turns of very heavy wire.

Series dynamos are not used as theatre arc-lamp generators; however, one make of very powerful arc generator does incorporate a small series dynamo whose function is to excite the field magnets. This machine will be examined when we come to the class of "separately excited compound-wound dynamos."

Series dynamos furnish current at an increased voltage as the load increases—an undesirable characteristic for arc-lamp operation. Further, a series generator cannot "build up" voltage until the load has been applied. The reason for this is easy to understand. When the external circuit is open (as it is before an arc is struck), no current is able to pass through the field windings. With no field magnetism, there can be no current at the generator terminals.

Series field windings nevertheless play an important part in the compound-wound dynamos designed expressly for projection work.

The term "building up" applies to the production of current in the field coils of a self-excited generator, as most theatre generators are. Now, even electromagnets having soft-iron cores retain a small amount of magnetism, and accordingly act as very weak permanent magnets. This *residual magnetism* causes weak currents to be induced in the armature when the motor-generator set is switched on. Practically all of this induced current is fed back into the shunt field windings of shunt and compound dynamos, thus strengthening the magnetic field. The process of building up the field magnetism proceeds until maximum saturation is attained.

On rare occasions the projectionist may find himself embarrassed by failure of the generator to build up. There are various causes of this trouble, and also several effective remedies. A discussion of these is deferred to the concluding article.

In the *shunt dynamo* the field coils, which consist of many turns of fine wire, are connected in shunt, or parallel, with the brushes. The induced current accordingly has two circuits in which to flow: the field circuit and the external circuit. Usually the external circuit gets the lion's share of the current because the current divides between the two circuits in inverse ratio of ohmic resistance.

Figure 3 illustrates the general plan of the shunt dynamo. When both this diagram and Fig. 2 are thoroughly grasped, the compound and separately excited dynamos will offer no difficulties.

Shunt dynamos furnish a falling vol-

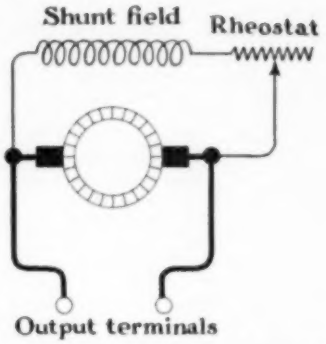


FIG. 3. Shunt dynamo. The rheostat connected in series with the shunt field controls the strength of the current flowing through the windings, and hence the strength of the field magnetism. Adjusting this rheostat varies the output voltage of the dynamo.

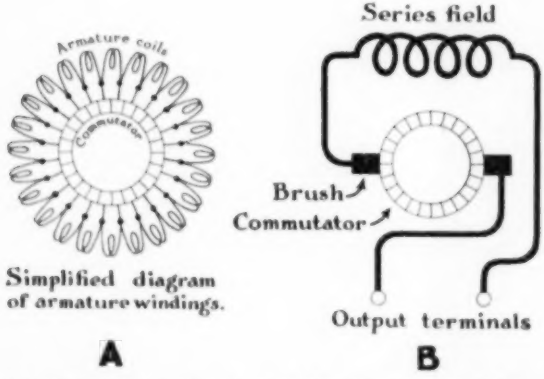


FIG. 2. Series dynamo. In *A* is shown the general plan of "lap" armature windings. Note that the ends of adjacent coils are brought out to the same commutator bar. Most arc-lamp generators have this type of armature.

* Second of a series of three articles on the development, application and maintenance of generators.

tage as load and current increase. This type of generator, while superior to the series dynamo for arc-lamp operation, is still not wholly satisfactory because a separate generator is needed for each arc lamp.

The *compound dynamo* overcomes the defects of series and shunt machines, yet preserves the good features of both. As its name indicates, the field magnets have two separate windings, one a series winding of a few turns of heavy wire, and the other a shunt winding of many turns of fine wire. The field rheostat regulates the current flowing through the shunt winding, and hence is connected in series with this winding, as shown in the diagrams. The amount of current flowing in the series winding is determined by the external load—the ballasts and arcs.

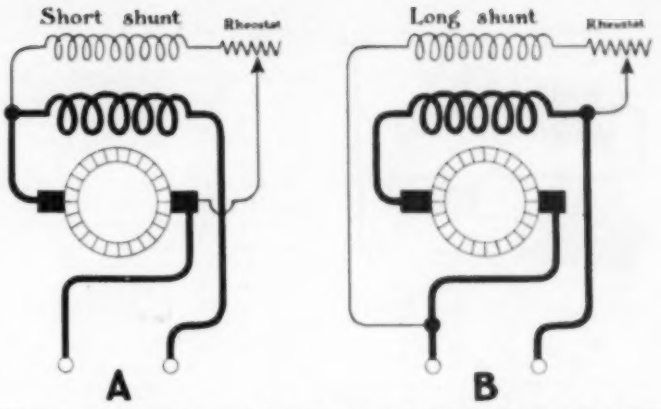


FIG. 4. Compound-wound dynamo. *A* is a diagram of a "short-shunt," and *B* of a "long-shunt" machine. In *A* the shunt field is connected across the brushes; in *B* across the output leads. Most arc-lamp generators are short-shunt compound dynamos.

Characteristics of Compound Dynamos

Fig. 4 shows two types of compound dynamo. The two are distinguished only by the connections of the shunt field. Most arc generators are of the "short-shunt" type (i. e. the shunt field is connected across the brushes).

The shunt and series fields of compound-wound arc-lamp generators are wound and connected so that their magnetic fields reinforce each other. By proper compounding the voltage at the generator terminals remains constant, or nearly so, regardless of the load.

In an "over-compounded" dynamo, which has a greater number of turns in the series winding than has a normally compounded dynamo, the voltage rises somewhat as the load is increased. An arc generator should be normally or only very slightly over-compounded — never under-compounded.

It should be remembered that a generator can be properly compounded only for loads lying within certain limits. For loads outside these limits perfect generator performance cannot reasonably be expected.

The *separately excited dynamo*, shown in Fig. 5, is similar to a compound-wound dynamo, except that its "shunt" field is excited by a small auxiliary dynamo. There is thus no electrical connection between the main generator and the separately excited coils. This method of obtaining field magnetism, utilized in the Motiograph Hi-Power 125—250 amp. generator set, makes for almost perfect automatic current regulation and stability of the arc. The exciting dynamo is a series machine, and its armature is on the same shaft as the armature of the main generator and the rotor of the driving motor. Note that the field rheostat is inserted in series in the exciting circuit.

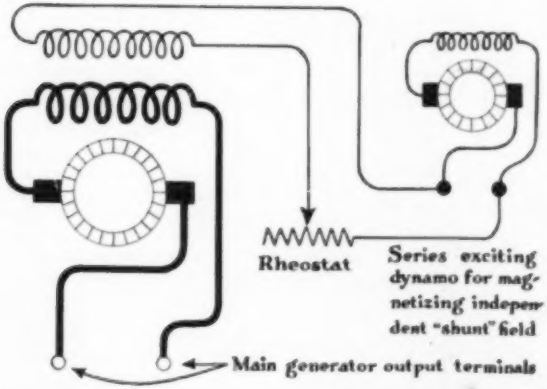


FIG. 5. Separately excited compound dynamo. The auxiliary dynamo which excites what would otherwise be the shunt field of the main dynamo is a small series machine whose armature is placed on the same shaft as the armature and driving motor of the main dynamo. The larger Motiograph Hi-Power generator is a separately excited compound dynamo.

Most arc generators and other small dynamos have 4 or 6 magnetic poles in the field (2 or 3 complete magnetic circuits). Each pole consists of a soft-iron core (usually laminated to prevent heating caused by "eddy currents" back-induced from the revolving armature) having both the series and shunt coils wound around it. In the ordinary compound-wound and separately excited dynamos, the shunt (or separately excited) field furnishes the greater part of the magnetism, while the series field functions primarily as a regulator, boosting voltage as load increases and reducing it with declining load.

The action of the series field is sometimes aided by the introduction of small poles called *interpoles* between the main poles. These in-between poles are series wound, and serve to provide better voltage regulation over a wide range of load. It is only necessary for the projectionist to keep in mind that the interpole winding is continuous with (in series with) the main series winding. Many arc-lamp generators, however, do not have interpoles.

Types of Armature Windings

To most of us the field windings of a generator are very easy to understand because of the simplicity of their arrangement. And it is therefore a simple matter to test individual field coils for short circuits and other defects. Armature windings, on the other hand, seem something of a mystery because of the complexity of their distribution and connections to the individual bars of the commutator, the automatic reversing switch which changes the induced AC to DC.

The main point to remember is that

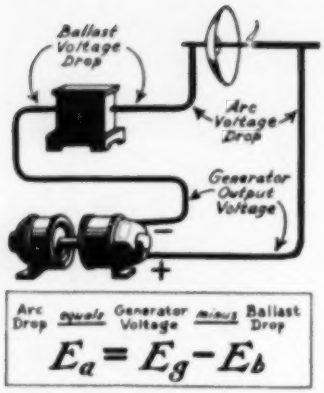


FIG. 6. Fundamental plan of a projector arc-lamp circuit. Shown are the points in the circuit at which a voltmeter should be applied to measure generator output voltage and the ballast and arc voltage drops.

the armature winding is a continuous winding, a closed coil. This winding is tapped at specified intervals, however, in order to bring out leads for connection to the commutator bars. The two common methods of winding armatures are the "lap" and "wave" windings.

In lap winding the ends of each individual coil wound on the slotted armature core are brought out to adjacent commutator bars, as shown in "A" of Fig. 2. In wave winding the ends of any one coil are widely separated on the commutator, and are thus somewhat more confusing to trace.

Lap winding, the simplest of all, is widely used for dynamos designed to deliver large currents at low voltage. If your generator has as many brushes as it has main poles, it probably has a lap-wound armature. Wave-wound dynamos usually have only two brushes, regardless of the number of poles.

As a rule, grounded, shorted, and open armature coils cannot easily be located and repaired by the projectionist. When such defects appear to exist in the armature, a replacement armature (together with shaft, commutator, etc.) should be put into service until the old one can be rewound and varnished by service men experienced in this highly specialized shop work.

Brushes and "Neutral Point"

The individual copper bars of the commutator are insulated from one another and from the shaft by specially processed sheet mica. Both the bars and the mica separators are held in place by wedge-shaped "V" clamping rings which fit into the recesses provided on the commutator bars.

The mica separating the bars is undercut to a distance of about 1/16 inch below the surface of the commutator. And the undercut must be maintained in order to avoid faulty contact of the brushes with the copper, and consequent severe sparking. The reason for this is the fact that copper is a trifle softer than mica, and hence tends to wear below the level of the mica.

Brushes are usually made of a special grade of graphite, a variety of carbon. These are wide enough to span 2 or 3 commutator segments, depending on the make and model of generator. The brushes are to be positioned at the "neutral point" when the dynamo is supplying current under normal load.

Sparking is at a minimum and the efficiency of the dynamo is at its highest when the brushes are positioned at the neutral point. At this point the brushes short-circuit only those coils in which no current is being generated at the moment, the current collected being obtained from other armature coils and transmitted to the commutator bars under the brushes by means of the continuity of the armature winding.

Should the brushes be placed off neutral, they would short-circuit "live" coils, and considerable sparking, as well as heating of the armature, would occur.

The neutral point shifts slightly around the commutator as the load increases or decreases. In modern theatre generators, especially in those having interpoles, the shift of neutral point is almost negligible.

Ballast Circuits

An arc-lamp circuit is very simple because it contains only two units, the ballast resistance and the arc, itself, connected in series, as shown in Fig. 6. Also indicated in this drawing are the points where the terminals of a voltmeter should be applied in order to measure (1) generator output voltage, (2) arc voltage-drop, and (3) ballast voltage-drop. Since these two "drops" represent the total resistance of the external circuit (disregarding line-drop), it is obvious that arc and ballast drops added together equal the output voltage of the generator.

Arc-drop is very important to the projectionist, since as this is the voltage at which the arc operates. To measure arc-drop in volts, strike the arc in one projector, and when the arc is burning normally, apply a DC voltmeter across the arc-lamp table switch. The reading will be the arc-drop.

One arc should also be burning normally whenever ballast-drop is measured with a voltmeter.

Ballast rheostats are necessary when multiple-arc generators are used, as explained in the previous installment. Moreover, there is a minimum ohmic value of ballast required to enable the arc to burn steadily without undue attention from the projectionists.

In the case of the LI mirror arc, the voltage absorbed by the ballast should be close to 20 or 25 volts, and certainly not less than 15 volts. The output voltage of the generator should accordingly be about 80 volts for this type of arc.

The HI arc requires somewhat less ballast than the LI arc. In the case of simplified HI arcs, the ballast should absorb from 15 to 20 volts, never less than 10 volts. A 45-volt generator is not quite adequate for best control and burn-

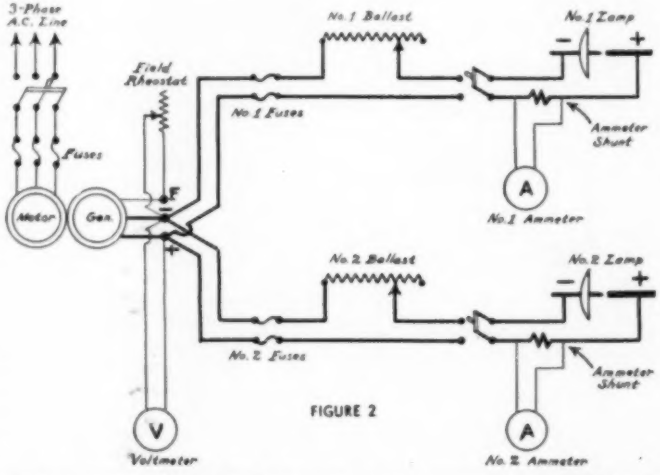


FIGURE 2

FIG. 7. A complete arc circuit having two projector lamps powered by a single multiple-arc motor-generator set. Note the hookup of voltmeter and ammeters. The entire circuit "floats," that is, there are no grounds in it.

ing of the arc: a 50-volt machine, however, is fairly satisfactory.

Higher-powered HI lamps—those of either the condenser or reflector type having rotating positives—require a proportionately greater ballast resistance. A 75 to 90 amp. arc., for example, operates satisfactorily with a ballast absorbing 20 to 25 volts, and not less than 15 volts. The generator output should be 80 volts, as an average. HI arcs in the 100-amp. range require about 25 volts ballast-drop and a generator output of 80 or 90 volts.

The current consumed by the arc and its associated ballast is measured in amperes. The amperage flowing in all parts of the arc circuit is the same, hence the ammeter shunt may be inserted anywhere in series with the line.

If the ammeter, itself, is located at a considerable distance from its shunt, as is sometimes the case, the meter must be calibrated to compensate for the line-drop of its leads. Many manufacturers furnish 25-foot ammeter leads. Since the meter is factory-adjusted to read correctly when these leads are used, care must be taken not to shorten or lengthen them.

The voltmeter on the control panel measures the generator output voltage. This voltage—and consequently the arc current—may be adjusted by the field rheostat which controls the generator shunt field.

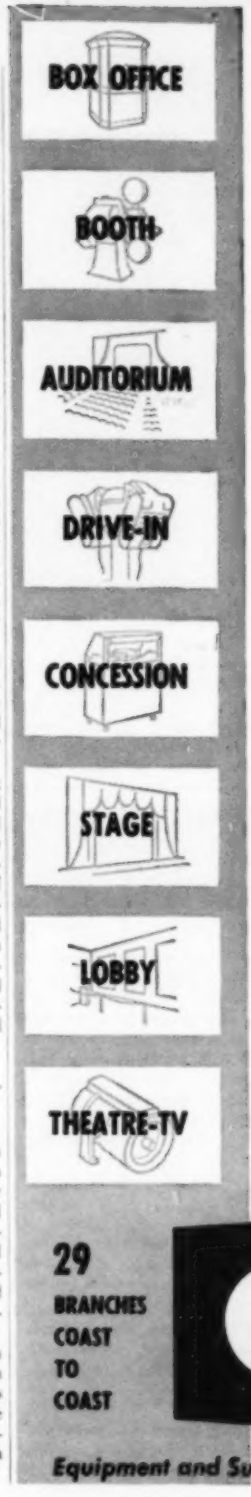
In Fig. 7 we see a complete wiring diagram for two projector arcs supplied by a single multiple-arc dynamo powered by a 3-phase AC induction motor. Note that each arc has its own individual ballast resistance, and that neither side of the line is grounded. Manufacturers' wiring blueprints may look different and more complicated than the diagram given here, but in reality they are essentially the same. Comparison will prove helpful to the projectionist by increasing his ability to read electrical wiring diagrams.

[TO BE CONTINUED]

Color Council Elects Evans

Ralph M. Evans, head of Eastman Kodak's color control division, has been elected Secretary of the Inter-Society Color Council. The Council is composed of more than 20 member groups, including the SMPTE, American Psychological Association and Society of Industrial Designers. Its purpose is to stimulate and coordinate research, and standardize industrial practices, relating to color.

Standardization of color films has been and is Evans' responsibility at Eastman Kodak. He is the author of numerous scientific articles on color, and of the book, "An Introduction to Color," published in 1948 and reviewed by IP on Page 24, March, 1949 issue.



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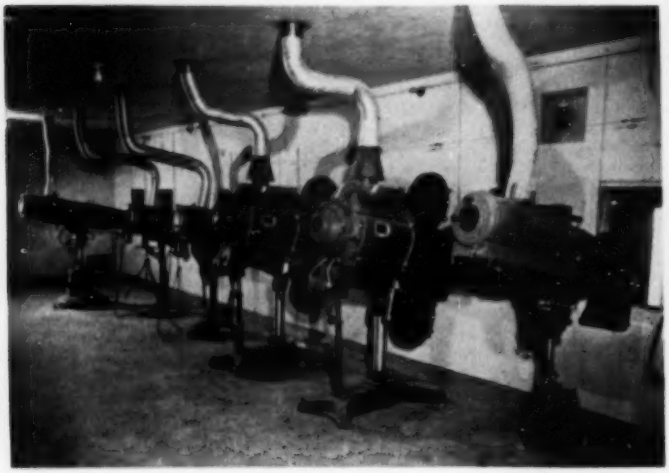

A PROJECTION room at a college which could well be used as a pattern in planning a professional theater projection room is that at the East Los Angeles Junior City College, Montebello, Calif. The room, said to have cost $25,000, is part of an expanded audio-visual program at this 6000-student institution.

The installation (shown in the accompanying illustrations) consists of two 16-mm Holmes projectors with Strong (Toledo) 1-mm Junior arclamps; also, two 35-mm Holmes projectors with Strong Mogul arclamps. Two Strong Trouper carbon arc spotlight projectors double as spotlamps and as slide and film strip projectors. The throw is 140 feet to a 24-foot screen. Space and portholes have been provided for Tv cameras.

There are also four Strong rectifiers, a film inspection and splicing table, reel magazines, 3-speed record player, a tape recorder, a 20-inch Tv monitoring receiver, amplifiers, and a 10-mike mixing console. J. M. Boyd Co., Los Angeles, installed the equipment.

Elaborate Electronic Equipment

The portable microphone mixing console for 10 microphones may be used on the stage or in the projection room for mixing the sound level. This is a 500-ohm unit of broadcast quality. The Concertone tape recorder is in a console, with a 3-speed Garrard record changer for playing 33 1/3, 45 and 78 r.p.m. records, and an Altec AM and FM tuner.

In another all-metal Hammertone-finish cabinet is a 20-inch Conrac Tv receiver for monitoring any stage programs televised, thereby making it possible, with the use of a 16-mm camera, to make permanent visual and sound record of these programs.

The power amplifiers consist of an Altec 126A 18-watt amplifier, driving a 256C 75-watt power amplifier, with an additional 75-watt power amplifier driven by the line amplifiers in the mixing console for public address. Switching is provided so that either amplifier may be used as an emergency amplifier. The sound-on-film speaker is an Altec AX4 speaker system which consists of two 803 low-frequency drivers, a dividing network and a 290 high-frequency driver.

There is a D.C. exciter lamp supply for each of the 35's, and one for the two 16-mm projectors. For arclamp power there are two 70-amp Strong 3-phase rectifiers, and for each 16-mm projector there is provided a Strong 4-tube, 30-40 amp. 220-volt rectifier.

To the Editor of IP:

To date 26 theatres in New England have turned in a total of 480 pounds of copper drippings salvaged from their lamphouses. The drippings have been sold to a regular junk scrap dealer and via that route have found their way back to the smelters for reuse. The proceeds from the sale of this copper material have been turned over to the Heart Fund of the Variety Club of New England, Tent No. 23.

Inasmuch as a total of 480 pounds of copper scrap could be turned in by only 26 theatres, it is a simple matter of mathematics to figure out what the possibilities are if the more than 1000 theatres in New England would get behind this drive.

Now, this is something that is within the scope and control of projectionists. While the salvaged copper itself goes to help our war effort, it possibly permits the continued use of copper plating on projector carbons—and the proceeds from the sale of this salvaged copper help the pet charity of show business, namely, Variety Club Heart Fund.

All he has to do is send in the sweepings from the bottom of his lamphouses via film transportation trucks, without cost and they will have contributed to the cause for which we all should work.

JOE CIFFRE
President, Joe Ciffre, Inc., Boston, Mass.

To the Editor of IP:

We solicit your help in completing a collection of technical magazines on the theater business. We need the following magazines to complete a back file:

Motion Picture Projectionist, Vol. 1, 1928: Feb., 4; April, 6; May, 7; July, 9. We will pay cash plus postage for these back issues.

It may interest you to know that an IA projectionist down in the Canal Zone, Panama, was most helpful to us in obtaining a complete file of another technical magazine for the year 1932, thus rounding out another of our collections, which fact prompted this request to you.

L. L. BUTALA, Cinema Hobby Club, 630J Postal Building, WLA, Mar Vista, Calif.

BETTER FILM CARE

(*Continued from page* 11)

fect may be produced on the screen and the film may even become blistered from the intense heat. The in-and-out-of-focus effect usually begins during the second or third projection under conditions where the intensity is excessive. When this effect occurs, the focus shifts so rapidly from frame to frame that it becomes impossible for the projectionist to keep the picture on the screen sharply focused at all times. At these dangerously high intensities it is possible to blister the print so severely that it is no longer usable.

Two examples of blistered film are shown in Figure 9. At the early stages of blistering small bubbles occur between the emulsion and the base of the film and these areas have a dirty, grainy appearance. At later stages the bubbles break through the emulsion surface and appear as white spots with burnt edges. Blisters can be detected by examining the film by reflected light, at an angle close to the plane of the film, in which case they appear as tiny bubbles in the emulsion surface. More severe blisters can be seen from the base side of the film and have a whitish appearance. Heavy blistering, such as that shown in the lower illustration of Figure 9 can be seen from any angle. Blistered prints cannot be repaired or restored in any manner for further use in motion picture projection.

Keeping Aperture Cool

Several methods have recently been proposed for extending the safe limit for increased screen illumination. One method utilizes heat absorbing glass between the arc and the film. This filters out some of the infra-red portion of the arc spectrum, energy that only increases the temperature of the film and does not contribute to higher screen illumination. Many theaters employing higher amperages use a blower system for directing a current of air to the surface of the heat absorbing glass in order to keep the glass itself at a lower temperature. Air cooling has also been applied directly to the film in the aperture by means of high velocity air jets. These jets actually cool the film and permit it to perform satisfactorily in a hotter beam than could normally be tolerated. For the projector itself, water cooling has in some instances been applied to the gate in order to reduce the temperature of the metal in contact with the film and to make projector threading more convenient.

When maximum light output is desired from projection equipment, the

(*Continued on next page*)

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BETTER FILM CARE

(Continued from preceding page)

arc current should never be increased arbitrarily without first ascertaining by test whether such procedure is liable to cause film damage.

Testing Projector Performance

Final testing of any installation of projection equipment should include the projection of test film to insure that the equipment is operating properly and that misadjustments will not cause damage to prints.

The following test procedure is recommended for film testing of projection equipment:

FILM: Eastman Fine Grain Release Positive Safety Film, Type 5302.

PROCESSING: Normal. The image should contain dark areas distributed about the frame and especially near the center.

AGE: *Film can be used for only one test.* Previous projection makes the film test less critical, and the results difficult to interpret.

STORAGE: Film must be used within six months of the processing date. The processed test film should be kept in a closed metal film container.

TEST LOOP: Nine-foot loops are recommended. Splice a fresh 9-foot piece into a loop, and thread into the projector. Magazine doors will probably have to remain open, and the loop may have to be guided by hand to prevent its twisting off the sprockets.

TEST: Strike the arc and burn-in at least 1 minute. In general, set to the maximum operating current, condenser setting, screen light, etc. available to the projectionist. Start projector, open dowser and change-over. If possible watch the projected picture on the screen, refocusing frequently as needed. Count 30 to 50 revolutions of the loop (3 to 5 minutes projection). Stop the projector and remove the film for examination.

EXAMINATION: Look first for any blistering of the film. Examine the emulsion side by reflected light at an angle nearly coincident with the plane of the film for any small raised blisters. A hand magnifier is helpful but not essential. Severe blisters will show on the screen and on the film as white pinholes in the image. ANY SIGN OF BLISTERS INDICATES THAT THE ARC INTENSITY IS TOO HIGH OR THAT FAILURE OF THE FILM PROTECTIVE DEVICES HAS OCCURRED. The regular prints are in danger of damage under any conditions which will produce blisters on the test loop.

Look also for excessive scratching, perforation damage, or other evidence of faulty mechanical adjustments in the projector.

If the test loop is undamaged, then the projection equipment will handle normal films safely (when operated at the arc current, condenser settings, etc. at which the test was made).

CONCLUSION

It is a well established fact that film damage does occur and that it may be caused in a variety of ways and in any one of the various places where film is handled. The material offered here has been presented with the sole purpose of helping to reduce unwarranted film damage and in no way is it intended as a condemnation or criticism of any single individual or group of individuals.

The information, suggestions and recommendations contained herein are based on the results of numerous investigations and observations related to various types of film damage which have been brought to the attention of the Eastman Kodak Company over a period of many years. It is our sincere hope that this material will foster a greater spirit of cooperation among all individuals throughout the industry in an effort to eliminate needless waste and to secure the maximum useful life for all motion picture prints.

New Recording Method

A new recording method, producing an optical sound track that can be either variable-density or variable-area, as preferred, will be introduced by Robert Dressler, Director of Research and Development for Paramount Pictures, on April 16th. Dresssler will present a paper and demonstration before a meeting, on that date, of the SMPTE's Atlantic Coast section. Heart of the new recorder is a crystal that is stressed by the voltage to be recorded and modulates the recording lightbeam proportionately. E. M. Stifle, Chairman of the Atlantic Coast Section, announced the meeting.

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Marion Sanders, IA Local 507, at his "ham" radio setup (W4PKT) in Macon, Ga.

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Amos now proposes (and has won wide ready acceptance for) the idea of monthly awards to all IA radio "hams" who succeed in contacting 10 or more brother IA men. Award certificates, signed by IA President Dick Walsh will be given to every IA man who qualifies. The rules are simple, as follows:

Simple Participation Rules

Send to Amos your log sheet showing any 10 IA radio amateurs worked.

IA Local Union numbers and date worked must be included.

No QSL cards are necessary.

To those most enterprising of IA men who work not 10 but 25 brother IA men will go a special Gold Award for exceptional merit, also duly certified.

Amos is particularly concerned about a steady expansion of the official IA-IP listing of radio "hams". If any IP reader knows of a brother IA ham who is not included in this fraternal listing, by all means tip him off to send in his name and other pertinent data to Amos, whose address is listed at the end of this item.

The official IA-IP calling frequencies are as follows:

28,700—14,250—7250—and 3950

Suggested Time Schedule

Amos suggests the following time schedule for the IA-IP gab fest: each Monday at 10 A.M. (Pacific Standard Time); 12 Noon (C. S. T.) and 1 P. M. (E. S. T.), on approximately 28,700, QRM permitting. Join Amos and the rest of the disease-laden "hams" at that time.

Altec Expands Facilities

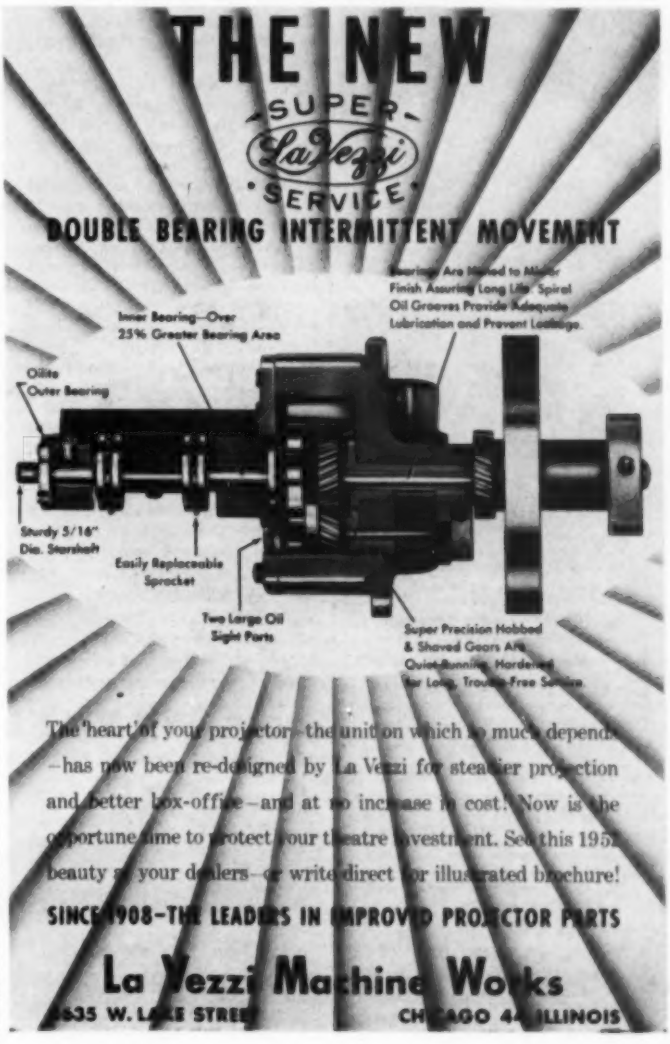
To maintain peak service to its clients in the face of current demands Altec Service Corporation has set up a new division to cover the area from Newark, N. J., on the east to Pittsburgh, Penna., and from Syracuse, N. Y., southward to Norfolk, Va. Headquarters of the new division are at 642 Broadway, Newark. L. J. Patton is the new division manager; and Glenn Pinckney and D. A. Peterson are his North and South branch managers, respectively.

Altec's Northeastern division, now relieved of the responsibilities taken over by Patton's new group, still comprises the Metropolitan New York area, all of New England, Long Island and the Hudson River Valley. C. S. Perkins remains its manager; R. E. (Red) Pierce has been promoted to manager of its Boston branch and Ralph Kautzky named manager of the New York branch.

PROJECTION SCREENS

(*Continued from page 6*)

those almost forgotten nickelodeon days when the picture was thrown on a white plaster wall. For the drive-in, using in-car speakers, needs no perforations in its screen; having a very large picture, it can't afford to waste light on perforations; being outdoors it does not want to expose to weather any kind of fabric, whether woven or plastic. The drive-in, therefore, projects on a flat, solid surface. But a cycle is not a circle; the surface of the drive-in screen is not plaster. It is a special paint—a drive-in screen paint—in which the pigment is titanium dioxide.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The heart of your projector—the unit on which so much depends—has now been re-designed by La Vezzi for steadier projection and better box-office—and at no increase in cost! Now is the opportune time to protect your theatre investment. See this 1952 beauty at your dealers—or write direct for illustrated brochure!
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La Vezzi Machine Works
3535 W. LAKE STREET
CHICAGO 44, ILLINOIS

SMPTE CONVENTION

(*Continued from page 12*)

high-speed techniques used in industry, and Thursday to photography.

On Friday Chester Beachell of the National Film Board of Canada is scheduled to present a "simplified preamplifier with high gain, low distortion and exceptional dynamic range and frequency response" built out of only 12 components, including tubes. A. L. Holcomb will describe a non-rotating device for converting single-phase 115-v. a.c. to three-phase 230-v. a.c. Willy Borberg of General Precision Laboratory will analyze a modulated air blast method of reducing film buckle in the presence of high intensity projection light and its accompanying intense heat.

SMPTE Committee Sets Goals For Good Screen Illumination

In a circular letter dated March 10th, which the Society of Motion Picture and Television Engineers has sent to the 125 theatres that cooperated in its screen brightness survey, W. W. Lozier, Chairman of the Screen Brightness Committee, sets forth the following desirable goals for screen illumination:

1. The center screen brightness should be between 9 and 14 foot-lamberts.
2. The illumination at the two opposite sides of the screen should be identical.
3. The illumination at all four corners of the screen should be identical.
4. The illumination at any point of the screen should be identical with both projectors.

Committee Chairman Lozier concedes that "we cannot at this time specify just how much departure from these goals should be tolerated." Also that as yet "there are no recognized standards in regard to distribution" of light over the area of the screen. "We are not able to say just how much unbalance" (of illumination as between two sides of the screen) "should be tolerated. However, in cases where the light at one side of the screen is more than 1.5 times that at the other . . . the screen will certainly appear objectionably brighter on one side. . . ." With reference to difference in illumination at changeover: "We cannot say just how much difference should be tolerated. . . . It is the writer's experience that differences between projectors of 20 per cent or more are noticeable and objectionable. . . ."

The work of the Committee is continuing in an effort to establish some of these limits which now do not exist.

LIGHT AND ANGSTROM UNIT

(*Continued from page 14*)

comparison of these different units of measurement. It also shows that the range of available measuring units is comparable to the range of electro-magnetic wavelengths. That unit is used which best suits the length of the particular wave to be measured.

Wavelength and Frequency

From this it is obvious that the Angstrom Unit scale is considerably more practical for measuring wavelengths of visible light than any of the other common units. Accordingly, the visible spectrum is thus scaled in the accompanying illustrations. The infra-red or heat waves are shown scaled in microns. The radio waves are shown measured (according to early practice) in meters. Radio waves now are, of course, more commonly scaled in frequencies than wavelength. Light similarly can be scaled in frequencies. It has been noted above that violet light at the edge of the ultra-violet has a frequency of 750 million million vibrations per second (750 mega mega cycles) and also a wavelength of 4000 A.U., and that both of these statements mean exactly the same thing. It is obvious that the A. U. is the more convenient unit to use for light, just as kilocycles and megacycles are most convenient for radio.

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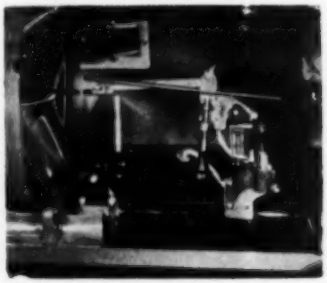
Uses positive carbon stubs *of any length*, without preparation, and without affecting regular operation of the lamp. When entirely consumed, the new carbon goes into use without losing the light.



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IA ELECTIONS

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LOCAL 188, KALAMAZOO, MICH.

Harry Williams, *pres.*; Harold Sargent, *vice-pres.*; Leeman J. McCarty, *bus. rep.*; Glen VanderLaan, *sec.*; Howard Woods, *treas.*

LOCAL 409, SAN MATEO, CALIF.

Charles J. Wagner, *pres.*; George Malm, *1st vice-pres.*; Robert Dunbar, *2nd vice-pres.*; Raymond Cayla, *3rd vice-pres.*; Richard Rhodes, *4th vice-pres.*; Rudy Ivancich, *5th vice-pres.*; John Turturici, *bus. rep.*; Amos R. Kanaga, *sec.*; Howard Bobbitt, *treas.*; Harry Hilyard, *sgt.-at-arms*; Wesley Schenkel, Storme Wade, Joseph Turturici, *trustees*; Malm, Dunbar, Cayla, Rhodes, and Ivancich, *exec. board members.* John Turturici and Raymond Cayla, *del. to A F of L Theatrical Federation* and to *IATSE District Council No. 1 meetings.*

LOCAL 586, COLUMBUS, NORFOLK, HASTINGS, GRAND ISLAND and YORK

W. E. Snyder, *pres.*; F. L. Kerwood, *vice-pres.*; Leo Tews, *bus. rep.*; Louis Christoffersen, *treas.*; Conrad Kreiger, *sec.*; E. O. Hart, *fin.-sec.*; Fred Driskell, O. P. McCurdy, *exec. board*; R. R. Kerwood, R. C. Berger, Alva Brooke, *trustees.*

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Technicolor Breaks Records

Technicolor Motion Picture Corporation broke all production records in 1951, Dr. Herbert T. Kalmus, President and General Manager, reported to stockholders early in April. The number of feature films produced in Technicolor increased from 70 in 1950 to 76 in 1951, a gain of 8 percent; footage of color prints ran to more than 392 million feet as against a previous 312 million, for a gain of 25 percent; sales crossed $28 as compared with a previous $23, a gain of 21 percent. Further progress is forecast for 1952, when the number of Technicolor features in production or preparation or under contract has already risen to 89 as compared with 1951's 76.

Meanwhile John Nickolaus, veteran superintendent of photography at MGM, predicted in Rochester, N. Y., where he was studying Eastman Kodak's latest color processes, that all pictures will be in full color in the near future, and black-and-white a thing of the past. Among other advantages, this will allow actresses to wear ordinary street cosmetics and male players no make-up at all, Nickolaus believes.

Radio-TV Production Off

Combined production of radio receivers and TV receivers declined nearly one-half (43 percent down) in the first two months of 1952 as compared to the corresponding period of 1951, the Radio and Television Manufacturers Association reports. The combined output this year totalled only 2.2 million sets as compared with the previous figure of 3.8 million. Production of radio sets was significantly greater than that of TV receivers —814 thousand TV units against 1,391 thousand radios.

Eastman Kodak Promotes

Kodak-Pathe, Eastman subsidiary in France, has promoted Lucien Vacher, assistant general manager, to be general manager; and Jacques Tassel, deputy manager, to become manager of the Vincennes plant.

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EVERY PART REPLACEMENT, repair or overhaul need of your booth and accessory equipment, *resulting from normal use,* is covered by the RCA COMPREHENSIVE PARTS and REPAIR PLAN. With this all-inclusive coverage you are protected against manpower and parts shortages, high costs, repair delays, shutdowns. Check the advantages. Don't be without this valuable, low-cost, money-saving protection any longer.

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Even major overhauls of projector mechanisms, intermittent movements and arc supply MG sets are provided under the RCA COMPREHENSIVE PARTS and REPAIR PLAN. In such cases the Plan covers all costs of factory or repair shop labor in addition to cost of parts. It also provides for loaner units without charge and for all shipping charges both ways.

It costs so little to protect so much

The advantages of RCA Service are yours at a cost so low, a few admissions daily pay for it. *Write for complete information.*

RCA SERVICE COMPANY, INC.
A RADIO CORPORATION of AMERICA SUBSIDIARY
CAMDEN, NEW JERSEY

THREE-DIMENSIONAL PROJECTION IN EUROPE

(Continued from page 9)

ter of taste. If the stereopoint—that is, the point where the two optical axes meet — is adjusted to the nearest plane of the object photographed the whole object will appear to lie behind the screen; if the stereopoint is adjusted to the middle of the depth of the object half of the object will appear to protrude from the screen into the audience. In my opinion this effect should be used very sparingly—for example, a gun pointing at the audience. In shorts and in publicity films it may be used more freely. Generally, however, the effect of a part of the object sticking out of the screen that borders it is not artistic, although the public may think it amusing."

Turning aside from considerations of photography Mr. Weber looks into projection room requirements from the point of view of current European practices and his own preferences.

Stereoprojection

"In my opinion, and I have studied literally more than 1,000 patents on this subject, it is not possible to project stereofilm satisfactorily without some alterations in the projection room. The synchronized dual projector system is essentially obsolete for various reasons. A single projector is called upon to project simultaneously a pair of full-sized or nearly full-sized images which are positioned alternatively on a single film, at 24 film movements per second.

Apart from the problem of how to distribute the arclight evenly over the enlarged gate, a problem for which Mr. Norling describes various ingenious solutions, the projector needs larger sprockets—twice standard size for full-dimension images or 1½ times standard size for the Wideview images mentioned above. It needs a proportionately enlarged gate. It needs either two separate lenses, placed one above the other, or a single large diameter lens with a pair of wedgeprisms mounted in front of it to superimpose the images. These projection lenses should be at least f/2.0, preferably f/1.6 or f/1.4.

"Finally, there will not be in the beginning, nor for years to come, enough stereofilms to provide continuous three-dimensional showings. A dual-purpose projector, capable of showing either stereo or "flat" films is possible. The sprockets, the gate and the lens (if a double lens is used) must be interchangeable. The German Askania Camera and Projector Manufacturing Company are now studying a converthile 35-mm projector of this kind.

Stereoviewing

"Polaspectacles have now been internationally agreed upon as providing the best viewing method so far devised. In a year or so I expect to be in a position to offer economically and practically useable autovision screens. But in sizes up to about 7 feet wide and therefore for non-theatre showings only. Autovision screens will always impose more restrictions on the spectators than the polarized light method. Polaspectacle stereoprojection of true-to-life three dimensional images has now become a fully satisfactory and practical proposition."

Gerald Pratley, writing in Films in Review, a monthly publication of the U. S. National Board of Review of Motion Pictures, Inc., comments favorably on the two-projector, 3-dimensional films shown at the Festival of Britain. A condensation of his remarks follows:

"In spite of all I had read and heard about the 3-dimensional films shown at the Festival of Britain, I had never imagined anything could be so fascinating, so truly exciting. The magic of Norman McLaren began working its unbelievable trickery in the film used to introduce the

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EVEN TENSION TAKE-UPS
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audience to 3-dimensions, called *Now Is the Time* (to put on your glasses). Expectantly, the audience donned polarized spectacles, which are a great improvement over the old red and green ones. In the projection room two projectors, placed nine inches apart and fitted with special lenses, simultaneously threw on the screen projections of two prints of film. The audience's glasses translated this double image into a single, clear picture in three dimensions. . . .

"McLaren's second film, *Around Is Around*, is the most perfect and beautiful of all his remarkable attempts. . . . For the first time in motion pictures we see *around* a spherical shape, instead of seeing it flat. This alone is an exciting revelation. . . . Aided by superior Technicolor photography, and an understanding and complementary score by Louis Applebaum, McLaren's creation has unrestrained imagination and power. Like a symphony filling a concert hall, this 3-dimensional film seems to leave the screen, and appears so real and close that one is tempted to reach out and touch it. . . .

Stereophonic Sound

"The problem which faced Louis Applebaum . . . lay not so much in the content of the music, which is light-hearted and in waltz-time, but in correctly assigning the music to respective parts of the theatre. In order to match the added depth of the 3-dimensional film, the sound has to have direction. If a character walks from one side of the screen to the other the sound has to follow him. And when in stereoscopic films an object appears to come right out from the screen over the audience, the sound must travel from the front to the back of the theatre.

"To achieve this astonishing effect the designers of the Telecinema, where the Festival of Britain films were shown, introduced stereoscopic sound to complement stereoscopic vision. This entailed the use of four batteries of loudspeakers, one behind the screen, one each in the left and right corners of the screen, and one at the back of the auditorium. These four loudspeakers were fed from four magnetic soundtracks recorded on a single strip of 35-mm film. The film runs in a magnetic sound reproducer unit which is mounted behind the projectors and synchronized with them. By means of a 'stereophonic mixing console' the four tracks are picked up and fed through to the loudspeakers to which they are connected.

"The third and last of the 3-dimensional films shown at the Festival of Britain was an excerpt from the British-made, uncompleted *Royal River*. The excerpt is called *The Distant Thames* and is an essay in realism. It does not pretend to be more than a travelogue.

"The 3-dimensional cameras were placed on the deck of a boat and sailed down the Thames. The scenery, reproduced in delightfully subdued color, had 3-dimensional depth and a truly remarkable and pleasant effect. The foreground was clearly separated from the background, with the result that the spectator actually felt that by leaning slightly forward it would be possible to stroke the swans on the Thames. William Alwyn's music skillfully kept the mood.

"I see no reason why stereoscopic films, with their added realism, should not prove acceptable to everyone and inaugurate a new era in the history of the cinema, involving as great, or greater, changes in film technique as did the introduction of sound.

"I cannot imagine anyone wanting to stay at home to look at television when stereoscopic films have so much to offer!"

G. E. in Production on UHF TV

Low-power ultra-high-frequency TV transmitters are now in production at General Electric Company's Syracuse, N. Y., plant, Harold C. Towlson, G. E. transmitter engineer, announces. Development of larger UHF transmitters, to meet the needs of communities of every size, is under way, Towlson adds.

New TV Relay Link

A new radio-relay link which will ultimately be capable of carrying TV programs has been opened by A. T. & T. between Washington, D. C. and Charlotte, N. C. The link is 612 miles long and comprises nine relay stations. Some of the relay antennas are as high as 290 feet above ground.

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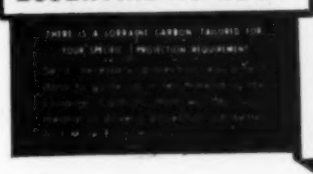

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GPL Achieves f- 0.78 Optics via 14 Months of Math

Showing the GPL f/0.78 optical system. The correcting lens, shaped to the curvature determined by many months of mathematical computation, is held by Louis Pierre Raitiere, left, its creator, and William Borberg, associate head of GPL development department.

A PROJECTION system with a working speed of f/0.78 (!) has been developed by General Precision Laboratory for large-screen theatre television and is now in quantity production.

The system is a modification of the conventional Schmidt optics, with important superiority in efficiency, it is explained. GPL uses the new optical system to spread the image formed on the face of a 7-inch TV tube over a theatre screen measuring 19 by 25 feet. Greater screen brightness, as well as uniformity of illumination over the entire picture area with no center hot spot, are claimed.

Throw, for the 25-foot picture, is 73 feet.

The 7-inch tube faces a spherical mirror 26 inches in diameter, coated with an extremely thin layer of aluminum. Thinness of the mirror coating is a minor factor in the efficiency of the system, since experiment showed that even when the coating was not altogether opaque and a little light was lost through it, efficiency was better than with a heavier coating.

Diaphragm Stops Down Speed

Used with the tube and mirror is a correcting lens or plate, 22.2 inches in diameter. All three fit into a projection barrel with the lens nearest the theatre screen, the mirror at the opposite end of the barrel, facing the lens, and the TV tube midway between, facing the mirror. A diaphragm or fixed iris is also mounted near the center of the barrel. It is this diaphragm that stops down the speed to f/0.78. Without it the rating would be f/0.67.

Accuracy of the double curvature of the correcting lens is the principal reason for the superior efficiency of the new system, GPL reveals; and this accuracy was achieved by painstaking, step-by-step computation lasting over a year. Louis Pierre Raitiere, French-trained scientist, with a graduate mathematician for assistant, calculated a detailed light-ray path for 100 separate, individual points on the lens profile. Each such calculation required 26 hours time; 100 of them took a total of 14 months. From the formula thus derived, American Optical Company casts the lenses for GPL, using lead glass.

A porous mold having been made to the calculated profile, the flat glass plate, placed over this mold, is heated to the point of plasticity; then vacuum is applied through the porous mold and the glass gradually drawn down to fill in the profile. After it has cooled its rear surface is ground optically flat, producing a plano-profile lens which is then given an anti-reflection coating.

The entire assemblage—optical barrel, mirror, TV tube, iris and lens—is hermetically sealed to keep out dust that would otherwise be attracted by the high dc voltage of the tube, and cooled by a system of recirculating air. It constitutes the latest improvement in GPL's direct-projection system of theatre television.

Nickel OK for Electrical Gear

Nickel can be used in functional parts of electrical equipment, the National Production Board ruled as of April 1st. Because of shortage of the metal, the NPA has issued a long list of products in which it cannot be used at present, either in pure form, as an ingredient in alloys, or as a coating. In projection room equipment nickel is used principally as an alloy ingredient for magnet cores and for stainless steel. Such use is now approved.

Magnet Material Scarce

Manufacturers of permanent magnets now have an active program under way for salvaging grindings and scrap, the Department of Commerce announces. Purpose is to conserve nickel and cobalt, magnet alloy ingredients, which are in short supply. For the same reason the magnets of magnetron tubes, extensively used in radar, are now being reclaimed by the Armed Forces, the Department reveals.

Nate Golden in Germany

Nathan D. Golden, Director of the Motion Picture and Photographic Products Division of the Department of Commerce, and for many years one of the strongest links between this industry and the United States government, is in Germany, where he will deliver the opening address at the International Photo-Cine Exhibition and Trade Fair at Cologne. He will attend the Film Festival at Cannes, and visit motion picture centers on the Continent and in England, before returning home.

Starrett to New York

Eastman Kodak's Warren D. Starrett, until recently assistant to the manager of the company's Chicago branch, has been transferred East to be assistant manager for sales of the New York branch.

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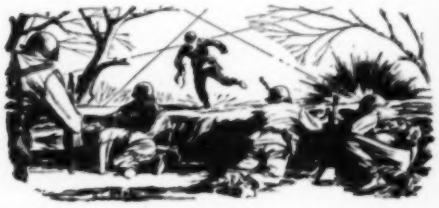
Captain Raymond Harvey Medal of Honor

THE 17TH INFANTRY REGIMENT was attacking Hill 1232 near Taemi-Doug, Korea. Able and Baker Companies became split by a Red-held ridge. Charlie Company, Captain Harvey commanding, was moving up to fill the gap when the dug-in Red guns pinned it down. Calling for covering fire, Captain Harvey advanced



alone through a hail of enemy bullets. One by one, he personally wiped out four emplacements of machine guns and automatic weapons. Then he caught a bullet through the lung. But he stayed on, refusing evacuation, until sure the objective had been won.

"In Korea," says Captain Harvey, "we stopped aggression by *united* strength. *You* were helping—every time you bought a Defense Bond. Because your Defense Bonds were doing more than just helping keep you, and your family, and your country financially stable. They were backing *us* up in the field with *American production power*, the surest support any fighting man can have!

"I hope you'll go on buying Bonds—many, many of them. For your Bonds—and our bayonets—are making America strong. And in today's cold-warring world, *peace is only for the strong.*"

* * *

Remember that when you're buying bonds for national defense, you're also building a personal reserve of cash savings. Remember, too, that if you don't save *regularly*, you generally don't save at all. Money you take home usually is money spent. So sign up today in the Payroll Savings Plan where you work, or the Bond-A-Month Plan where you bank. For your country's security, and your own, buy U.S. Defense Bonds now!

Peace is for the strong...
Buy U.S. Defense Bonds now!

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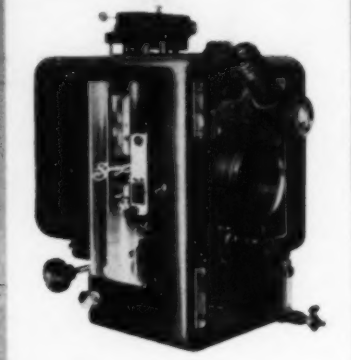

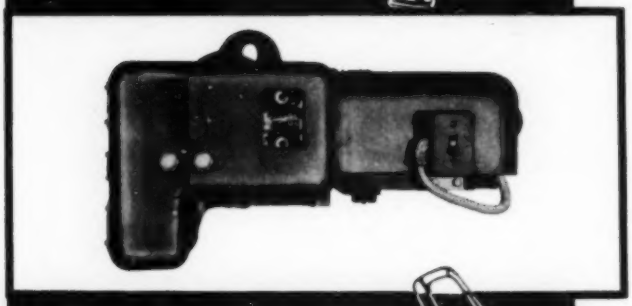

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Your projectors . . . your sound systems . . . your in-a-car speakers.

These three, more than any other drive-in equipment, are what makes a crowd . . . A happy, satisfied crowd . . . A crowd that will return to your theatre time after time to enjoy fine motion picture entertainment.

The crowd-wise, profit-wise theatre owner will see to it, therefore, that his projector, soundhead and speakers are the finest! . . . And throughout the world, there is none finer than SIMPLEX!

SIMPLEX PROJECTORS for the thrillingly bright picture patrons demand . . . the steady, flicker-free picture patrons will return to see!

SIMPLEX SOUND SYSTEMS for the crystal-clear tone, the great frequency range that makes every picture more enjoyable, every theatre more popular!

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